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The Measure of Civilization

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THE MEASURE OF CIVILIZATION

BY

GUY MORRISON WALKER

Author of: "Railroads and Wages," "Trust Companies," "What Shall We Buy?" "Railroad Rates and Rebates," Etc.

Civilization is that state or condition in which any people or society exists.

It is measured by the degree to which man has surmounted his natural limitations in time and space, and expresses itself not in terms of philosophic thought but in standards of living.

NEW YORK

1917

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FOREWORD.

In 1873 my father was appointed a Missionary to China. I remember the trip vividly. Stopping in Chicago we climbed the black interior of the waterworks tower for a view from the top. I recall the changing of cars at Omaha. The stopping of our train to permit a great herd of bison, that looked like a black cloud on the plain ahead, to cross the track; the narrow gauge branch at Ogden; the ferry from Oakland to San Francisco.

We crossed the Pacific in an old side-wheel paddle boat called "The China," and it took us twenty-two days to reach Yokohoma. The steamer from Yokohoma to Shanghai, and from Shanghai to Tientsin was only six or seven hundred tons burden, and in a storm while rounding the Shantung Peninsula, my mother was sure that we were lost.

The years of my youth were spent in travelling about North China on donkey back, in two wheel carts, in sedan chairs, or mule litters, with occasional trips on the rivers and canals in house boats, poled or towed by men.

The wages of the natives and the cost of living were so low as to be unbelievable. A

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single cash, worth one-fifth of a cent, would bring us joy for a day, and we used to boast that we could live well on our favorite Chinese foods at a cost of two cents a day. But in spite of this, the expense of travel was enormous, and days were necessary to prepare for even the shortest journeys. Carts, mules and drivers had to be engaged, supplies laid in, bedding packed in rolls, and not the least of our baggage was the heavy strings of copper cash and the blocks of silver bullion necessary to pay the expenses of the trip.

After nearly ten years of life under these conditions, I came back to America to college. It took us only fifteen days from Yokohoma to San Francisco. The time from San Francisco to Chicago had been shortened a day, and between noon and sunset we covered more miles than could have been done by a week of solid travel in China.

The contrast between methods of travel and the standards of living held a question mark constantly before my mind. After my graduation, I began travelling again. I could not see much difference in the mentality or moral sense of the different people, and the conviction grew on me that the difference between the Civiliza-

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tions in which I had lived was chiefly in the methods of transportation and that there was an inseparable connection between the cost of transportation in any given country and the standards of living that there prevailed.

In 1902 I wrote my monograph, entitled: "Railroads and Wages," which brought me a letter from Doctor Richard Ely of Wisconsin University to the effect that I had discovered a new principle in Political Economy, but it was not until the Winter of 1911 that the following lectures were written for delivery at Cornell University, Ithaca, New York, in March, 1912. They have since been repeated at DePauw University, University of Pennsylvania and Allegheny College. The pressure of business has made it impossible for me to respond to further requests for their delivery and they are now being printed in response to the many requests that have been made for printed copies.

The form of the material is due to its preparation for delivery as lectures, and although I feel that my proposition—that Civilization is measured in terms of transportation or by the degree to which man has surmounted the limitations of nature in time and space—is fully developed and sufficiently supported by facts

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and reason, still I do not pretend that the matter here printed attains to the dignity of a book.

I have always had a theory about books to the effect that if you wanted to bury an idea the best way was to put it in a book. In these days most men are too busy to wade through five hundred pages and up to this time when I have felt that I had any idea to communicate, I have compressed it within the pages of a pamphlet that might be read in half an hour.

The following lectures were prepared to consume two hours in delivery, and they can doubtless be read in less time. I feel that those who take this time to read them will not find it entirely wasted, and believe that if our people can be brought to realize the real place that our great railroad systems occupy in our everyday lives, it will bring about a change in the public attitude toward the regulation of railroads and the other means of transportation and communication. I hope that some, getting herein a glimpse of the true relationship, will give the subject that further investigation and exposition that it deserves.

GUY MORRISON WALKER.

61 Broadway, New York.

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THE MEASURE OF CIVILIZATION.

Lack of Mental Horizon and Historical Perspective.

I remember once, on a trip with my father in North China, the sun setting and we not yet in sight of the village where we expected to spend the night, stopping our cart by the roadside to inquire of an old farmer how far it was to the village which was supposed to lie beyond the low hill two or three miles in front of us. The old man said that he did not know. Father expressed surprise, and said that he had been informed that it was only ten or twelve li, and that surely he, living so nearby, could give us some idea as to whether it was more or less; but the old man drew himself up with dignity, and replied, "Why should I know? I have never been there," and pointing to the ground beneath his feet, said: "I live here."

To that old Chinese farmer, that village, only three and a half miles away, simply did not exist because it was the other side of the hill, to whose summit he had never been, and beyond which he had never seen, because he "lived here."

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If you never get outside of your home village or your home state, your world is that village or that state, and beyond it you know little or nothing. Your world, like that of the old Chinese farmer, is as much as you can see —like his, it is "all here."

If you have never looked through a microscope, all that it reveals simply does not exist for you. If you have never looked through a telescope, all that such a vision reveals is beyond your ken. The same thing is true in the world of thought. What you are unable to think or understand, whether it is spiritual or philosophic thought, economics or social relations, simply does not exist for you.

Thomas A. Edison was asked a few days ago by one of our leading New York editors, what he thought of the American system of education. He replied "There isn't any." Our college courses have been based on the theory that no one seeks an education except for the purpose of becoming a teacher. A college professor, who has himself received an education based purely on giving him a limited ability to teach a given subject, proceeds to lay out the courses for his students, ac-

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cording to what he knows and he looks with considerable disfavor on the student who tries to carry more work or who asks for courses beyond those prescribed.

The professor of Greek knows no sociology because he teaches Greek; the professor of Latin knows no economics because he teaches Latin; the professor of English knows nothing because he teaches English. At least one prominent political economist whose book I have looked over knows nothing of the Egyptians or the Greeks and has only a second-hand, or hearsay knowledge of the fact that there were Romans. All of them, like the old Chinese farmer, draw themselves up with dignity and say: "Why should I? I LIVE HERE."

Superintendent Maxwell, of our New York public schools, recently declared that "the best way to teach English was to study geometry." And Bacon insisted that: "A law should be passed prohibiting anyone from writing a line until he was past twenty-five years," adding, "it is seldom that one of that age has yet learned how to think."

The weakness of American education was

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recognized by De Toqueville. In his work on "America," he declared that "In a democracy, knowledge is sought not for its own sake, but for its utility, and scientific studies are followed for their practical advantages, while only a languid interest is taken in the theoretical side." The same idea was stated to me in another way recently by a young engineer, who, having graduated from a Pennsylvania college, had come to Columbia to study engineering. Speaking of his fellow-students in the engineering school, he said: "They are good engineers, they know their rules and formulas, but many of them never heard of William the Conqueror." It is this lack of perspective which, more than anything else, is affecting American education.

My purpose in these lectures is to give you, if possible, this perspective. I shall try to fix a new point in your mental horizon; to give you a landmark so far beyond the range of your previous mental vision in that direction, that when your attention is called to other subjects your vision there will also be carried beyond any point that you have seen before.

Education, for the sake of education, can

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never be made particularly attractive to a student; for, if pursued, the result at the best is a mere pedant.

But education, for the purpose of life, if you can get a glimpse of what life means, must grip your interest and induce at once an earnestness now lacking.

In his "Critique on Democracy," De Toqueville complains that the exclusive attention devoted to practical results in democracies causes the fundamental principles of civilization to be lost sight of; and he mentions particularly the Chinese, who, though enjoying at an early period all the blessings of an advanced civilization, yet became fossilized because they forgot the principles upon which their civilization originally rested. This warning is peculiarly applicable to us today, for our civilization has reached a stage of complexity that baffles the ordinary mind. People, immersed in the hurry and haste of modern life, have no time to study the great laws that operate in and regulate the social, political and industrial world. Each intent on his own peculiar problems, fails to perceive, much less to comprehend, the sophistry of the revolutionary schemes every day

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proposed. The fundamental principles upon which our political and economic structures stand are forgotten. The structure itself is attacked, and its demolition demanded merely because it has stood so long and is, in the popular mind, consequently old and out of date.

A hundred years ago there was not a mile of railroad in the world, nor a dollar invested in them. Today there are over 600,000 miles of railroad in the world, half of which are within the confines of our own country; and they represent an investment equal to one-tenth of all the values on this earth. Railroading is the greatest business in the world. It is natural, therefore, that when railroads occupy such a large place in our national life, that they should come under the attack of the unthinking.

I wish, therefore, to call your attention to the part played by transportation in civilization. The picture I shall draw must of necessity be broad, impressionistic and lacking in many details, but if I am successful in the effort that I shall make, you will have plenty of opportunity to fill out the picture and to supply the missing details during the rest of your lives.

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What Is Civilization?

We are so in the habit of identifying civilization with our own civilization that few recognize not only that there have been, but are, other civilizations. We fall into the same habit as the Greeks, and unconsciously regard ourselves as *the civilized,* and think of the rest of the world as barbarians.

Guizot, in his "History of Civilization," takes several pages in which to tell us what civilization is not, and then concludes that the chief idea contained in the word "CIVILIZATION" is "that of a people in the course of improvement and amelioration."

Buckle, in his "History of Civilization," gives up the task of defining the word "CIVILIZATION," and contents himself by describing as many as possible of the attributes of civilization.

But, to my mind, the term CIVILIZATION applies to the state or condition in which any people or society exists. The Stone Age had a civilization of its own, such as it was; and the Bronze Age had its civilization; there was a civilization of Egypt, of Babylonia, of Phœnicia, of Judaism, of Greece, of Rome;

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and even now we have Christian civilization, Mohammedan civilization, Indian civilization and Chinese civilization.

Primitive Man and His Problem

Go back to the beginning of the race and you will find from the earliest traces of mankind on earth, that the race had already become widely distributed. Wherever man was born, he was limited by the obstacles with which Nature surrounded him. A mountain range on one side was a barrier to his hunting in that direction. The river that flowed out of the mountains stopped his search for food in that direction, and the impenetrable forest reaching back from the river handicapped his hunting there.

But wherever these traces of mankind have been found, whether under the tropics of India and Africa, or in the caves of Germany and Scandinavia, whether the cliff-dwellers of Mexico and the Andes, or the lake-dwellers of Switzerland and Ceylon, there we find the traces of man's contest with Nature.

Hemmed in by the mountains, the rivers and the forest, man first wandered up and

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down along the banks of the rivers, because it was the easiest way to get from one known place to another without being lost; and so it is natural that the earliest remains of mankind are always found along the beds or courses of rivers.

These earliest remains are usually the garbage heaps left by the primitive camps of primitive man; and from these garbage heaps we learn upon what the early race lived and how they secured that living. The remains of animals and fish are mixed with the stone axes with which they killed, or the bone hooks with which they fished.

There is no question but that primitive man was at first a mere hunter and fisherman. He had not, at this time, learned to tame any animal; he was even without a dog as his companion. Little more than an animal himself, he preyed upon other animals, while they, if they could, preyed upon him.

The first knowledge practically that came to savage man was the fear of the dark, for with the falling of night, the beasts that preyed on him came out to harrass him. He worshipped the sun, because it gave him light and

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brought him safety. He worshipped the Moon, because even its lesser light added to his safety at night. It was, therefore, natural for primitive man when intelligence came to express his idea of God in terms of Light. Apollo was to the Greeks the far-darting who drove away their enemies. The Israelites followed the Pillar of Fire by night; and the Hebrew Psalmist expressed this in his prayer: "Hide not thy light from me, O Lord."

But savage man worshipped the Sun not only because it gave him light and safety, but because it was for him his first guide to direction, and when he travelled it was with a careful eye on the direction in which his shadow fell.

Wherever primitive man first found himself, it was a spot where there was enough to eat to sustain life, but when the hunting or fishing in the region of his cave became poor, he was compelled to move in search of food. It is quite certain that the earliest movements of mankind were efforts to find food; a movement from a place he had fished out to a place where the fishing was good, or a movement like that of our own Indians, from a place where the

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hunting had become poor to a new place where game was abundant. When existence under the then conditions seemed a hopeless task, he attempted to reach another region where Nature might be kindlier and its bounty more generous.

The Stone Age men were travelers, for their stone implements are found far from the quarries out of which they were made, and shell implements unquestionably brought from the seashores are found far inland.

The primitive huts of the Stone Age were nothing but an attempt to reproduce in the forests the caves in which he had previously sheltered himself in the hills.

The least glimpse at the condition of primitive man and his struggle for existence will give you a new meaning of the story of the Garden of Eden and show its allegorical character: See our primitive ancestors living amid plenty, and when this plenty was exhausted, driven by the outraged gods from the Garden they had spoiled, out into the wilderness or world in search of food; and the Tree of Knowledge itself was that better living was to be found only by laborious search.

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No matter where each particular race came from and no matter where it finally settled, the trail between the place from which they came to the place to which they went, became a beaten path. Some doubtless returned to the place from whence they came, if for no other purpose but to bring back some stone axe or weapon which had been left behind in their flight.

In his first migrations, primitive man knew no better way of carrying either the remains of his last kill or the stone axe with which he did the killing than to drag it along with him on the ground. His first real progress was made when he discovered that he could lift this load from the ground to his shoulders and carry it there with greater ease.

It was a great day for the race when a man found that he could bear a larger burden on his shoulders than he could carry in his hands or drag along the ground. For this discovery was the beginning of settled habitations. Instead of bringing his family to the place where the food was, he began to carry the food back to his family.

And from that day to this the transportation of food, or the other products of human labor

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has, when reduced to its lowest terms, been merely human labor; that is, the cost in human labor of carrying what human labor has created to the place where it could be consumed. And primitive man could devise no relief for himself from this burden, but to capture and enslave the weaker members of the race and compel them, by mere superior physical force, to carry his burden for him. Human slavery began when primitive man forced the woman he had captured to carry these burdens for him.

The black race, which has never to this day developed transportation beyond this point, remains the lowest in comparative civilization and has never developed sufficient intellect to invent writing, and so has left neither literature nor history nor any record of itself.

Whether in his original location or in his new home, man's efforts were naturally directed toward making use of that with which Nature had surrounded him. His first gleams of intelligence are shown in his attempts to explain the natural phenomenon peculiar to his region or country.

Taylor, in his valuable book on the "Early Races of Mankind," has a chapter on the geo-

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graphical distribution of the early myths of mankind, which shows, by the very character of these early myths, not only the habitat but the isolation of these early people who attempted to express the phenomenon of Nature in the terms of life as it existed for them.

Out of these myths came primitive religions. They deified not only the Sun and the Moon, but the phenomenon of Nature, the Winds, the Waters, the Thunder and Lightning, and attempted to appease by worship those malignant forces or animals that they feared. These primitive religions were so inseparably connected with the development of the communities and of the nations into which they grew, that they became national religions and developed elaborate rituals that again became interwoven into governmental forms and ceremonies.

It was not until a much later day that religions took on the spiritual significance that they now have, and yet, as our early students of civilization were church-men, it was natural that their studies should follow back along religious lines to these primitive myths; and it is perfectly natural that their minds trained in

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the discussion of theological dogma should come to regard civilization as a matter of religion and intellect.

Buckle states that the progress of Europe from barbarism to civilization is entirely due to its intellectual activity. Guizot declares that civilization is the development of the human mind and its faculties, but the truth is *that civiliation is a fact—a state or condition in which a race exists*—and it expresses itself not in terms of philosophic thought, but in higher standards of living.

The first movements of mankind were efforts to better his physical condition; his mental activities were confined to devising ways and means of satisfying his physical hunger. He sought first food, then more food, then better food, and finally a place where he could find warmer clothes, or else a place where he should have less need for them.

A race oppressed by hunger and cold gave little thought to the Immortality of the Soul. It was only after primitive man had satisfied his physical wants and reached a standard of living high enough for hunger to be absent, that the idea of property began to develop.

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It was only, if you please, when any man could go out and find his own food by his own efforts, that his fellow-men required of him the respecting of their property right in the food that they had gathered for themselves or their families.

Following this, came the recognition of primitive man's right to the woman he had captured, and her children; and only by slow progress have our ethical and moral ideas grown out of the development of the rights of property and of family. Of course, the development of these ideas did not put an end to the search for food, or still better conditions for living.

With the Bronze Age came the building of grave mounds—tombs—that marked the place where the family or clan had camped and where its forefathers had died. Apparently, the mounds were heaped up as a sort of landmark—a means to help mankind identify the places where he had formerly camped. But these grave mounds, marking former camping-grounds of families and clans, seem also to indicate at this period some sort of reverence for ancestors—the beginning, if you please, of ancestral worship.

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It is significant that these earliest grave-mounds of the Bronze Age are similar in character to the grave mounds of the Chinese at the present age; a fact, too, that would indicate that Chinese ancestral worship and burial system started at an earlier date than the Egyptian. For the Pyramids of Egypt are nothing but gigantic grave-mounds built out of stone instead of soil, and the Egyptian temples are only the carved and decorated copies of the dolmens of the Stone Age.

The transition from the Stone Age to the Bronze Age, as shown in the garbage heaps or tumuli, is so immediate as to indicate that the change was not due to evolution of the Stone Age man into a Bronze Age man, but an invasion of the habitat of the Stone Age man by a race that had discovered the use of bronze; so that this advance in the civilization of primitive man was due to a higher self-transporting ability of the Bronze Age man.

It was another great day for the race when some man noted that a fallen tree floated on the surface of the river, that he could not get across, and trusting himself to the floating wood, pushed, or poled himself across; and a

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considerable further advance was made when it was found that trees lashed together into rafts would not roll or turn over and would bear several men at once.

The next step in the development of man came with the domestication or taming of wild animals; first, probably the wolf-dog that skulked about the edges of the camp and gnawed the bones or refuse that primitive man left. Then the taming of sheep and goats; and from that time on, primitive man, instead of hunting wild sheep and goats for food, hunted for better pasture for the sheep and goats that he formerly hunted as wild animals.

His earliest occupation, next to hunting for food for himself, he now pursued in protecting from other wild animals the sheep and goats that he had captured and tamed. With the change in his occupation from hunter to shepherd, came a corresponding change in his weapons or implements; their distinctive character as weapons for killing gradually disappeared, and they came to be rather weapons or implements not only for the defence of himself, but of his flocks.

Cattle and horses were not domesticated un-

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til a much later date than sheep and goats. The life of mankind at this stage of the race's progress was constantly migratory. Whereas, primitive man, at an earlier time, had wandered in search of game and good fishing, he now wandered with his flocks and herds, looking for fresh pastures. But as mankind domesticated the animals that he had formerly hunted, so he finally learned to domesticate grasses and plants.

To the spot where early man had left his family, he brought the tree whose fruit had pleased him in the forest, and, sticking it in the earth, it grew. The edible roots and the plants with succulent leaves he treated in the same way, and to his little encampment he brought the grasses for his cattle; and to his amazement, the seeds therefrom grew in exaggerated and gigantic shapes in the fertilized soil about the encampment. The enlarged heads of these grasses proved to be the grains that have since become the chief food of mankind.

This process of development has really been necessary in order to permit the race to multiply. It takes a large territory on which to raise the wild game to supply the wants of a

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single family. It is doubtful if there were ever more than a half million of Indians in the region now occupied by our United States, nor could the country have supported many, if any, more, as long as their habits of living remained the same.

But when mankind domesticated the wild animals and protected the herds and flocks from the attacks of other wild animals, and hunted out good pasturage for them, ten times as many people were able to subsist on a given territory as could subsist thereon in the hunting and fishing days.

But the real peopling of the earth was made possible only by the cultivation of the soil, the raising of grains, and the possibility of producing the food supply for a modern state in a territory that formerly sufficed only for the flocks of a single chief.

But even this progress left mankind under a great handicap in its exhausting requirements upon human energy to accomplish results. This is shown in the early civilization of the Egyptians, with its wonderful temples and great pyramids. Their religious development, and what has come down to us of their laws and

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commercial customs, shows a remarkable development in intellectual ability and mechanical and engineering ingenuity; but it was a civilization that left mankind the slave of his physical limitations.

A hundred human hands hewed the stones from the quarries; a thousand tugged at the straining bands that skidded them along their way to their destination; ten thousand raised them by successive wedges to their final place; and one hundred thousand lives were spent in building a tomb for one.

Such a civilization as this was dependent upon human labor for everything; not only the production, but the transport of its foods made necessary the enslavement of almost the entire race. But there came a day when man learned to harness the ox, and the thousands who pulled at the skids were relieved to do other work.

In discussing the progress of civilization, we can, as I have said, ignore the Black Race which has shown itself unable to leave any record of itself. The two great races with which we are mostly concerned are the Turanians and the Aryans, who have always been more or less in conflict with each other.

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The early home of the Aryan race, universally ascribed to the Tigro-Euphrates Basin, is surrounded by plains over which a pastoral people could have made progress only with difficulty. These plains were occupied by the Turanians, who had not only domesticated the ox, but the horse, and who had learned not only to transfer their burdens from their own shoulders to the backs of their domesticated animals, but had learned to mount themselves on the backs of their horses which carried them with amazing swiftness over stretches of treeless and waterless plains, upon which flocks and herds would have perished.

The very names of the two races indicate their difference. The word "Tura" means the Swiftness of a Horse; or, in other words, the Turanians were the people who moved to and fro as swiftly as their horses could carry them. They had emancipated themselves from the weary plodding over plains, and galloped from place to place on the backs of the horses that they had tamed; descending for plunder upon the tents and camps of the Aryans who still wandered about on foot with their flocks and herds.

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There can be little doubt but that the migrations of the Aryans were due to the pressure upon them of the Turanians, and it was the Huns before Attilla and Genghis Khan and Timur who drove our ancestors out of the valley of the Euphrates into the woods of Central Europe. It was, in fact, these forests of Europe that acted as a barrier to the fierce-riding Turanians, and furnished a welcome refuge of our Aryan ancestors.

The name "Aryan" comes from a root that means "straight"; it is usually translated "erect —upstanding—" or, in other words, the Aryan race has been called the race that walked standing straight up. But it has seemed to me that the term has been mis-translated. The "Turanians" were so called because of their swift riding to and fro, and the name Aryan was given to our race to distinguish it from the "Turanian." In other words, the Aryans were those who did not go to and fro, but were those who went straight, or directly, from one place to another.

The horse riding Turanians, by reason of the facility with which they traveled from one part of the world to another on horseback, carried

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over all of Europe and Asia the knowledge that relieved primitive man of the necessity of bearing his burdens on his own back and taught him not only how to transfer it to the backs of oxen and horses, but how, by mounting himself upon them, to relieve himself of the previous laborious task of transporting himself.

Our Aryan ancestors, with their more or less fixed habitat, and with the necessity upon them of protecting their flocks and their herds from the swift-riding Turanians, developed the use of metal and the manufacture of metallic weapons and shields, and with them they were finally able to resist and turn back the pressure of Turanian invasion.

It is in the manufacture of metal, even from the earliest times, that the elements of transportation loom large and larger, until today, in what we may call the Steel Age of man's development, transportation is the largest single item that makes possible our enormous use of iron and steel, not only in railroads, but in shipbuilding and in our wonderful business buildings that now tower higher to the skies than anything that man has ever built before.

One day, while some Egyptians were pulling

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a heavy load of rocks on skids, one of the green pieces of timber slipped from its place, and, falling cross-wise in front of the load, rolled under the advancing skid; and to the amazement of those who were pulling the skid, the load rolled forward faster and easier than anything they had ever pulled before.

From the rolling trunk of a small tree to the invention of wheels was but a short step; but when wheels were invented, they were the greatest discovery that had been made up to that time by mankind. They transformed the whole method of land transportation, not only doing away with the friction of the skid, but relieving even the back of the ox from its burden and enabling it to pull four or five times as much as it could possibly carry.

The evolution of the wheel is worthy of a book in itself, but I can here only —"call attention to it."

To some races, these revelations never came. The savage of Africa never learned to tame the wild beast, and to this day bears on his own shoulders every needed thing of his own when he moves; or, if too burdensome so to move, he abandons it. The ivory stores of centuries still

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come down to the sea on the backs of these black men.

The revelation of wheels never came to our American Indians. They developed far enough to tame wild dogs and the Llamas of South America, and ultilized these to pull the simplest drags, but their brains never conceived a wheel; and while they drew a few simple hieroglyphics and kept scores in knots and tallies, they, like the black men, have left neither written language, history nor literature.

The point I want to make is that the Negro, who has never invented any sort of writing and who has neither history nor literature, is the lowest in point of civilization because he has never emancipated himself from the slavery of bearing his burdens on his own back. The Indian has emancipated himself from this burden only to a limited degree, and his civilization expresses itself in a few simple hieroglyphics.

While, as we shall see, other races who have more or less emancipated themselves from this burden of primitive transportation, have advanced in civilization in exact proportion as they have so emancipated themselves.

The advance of man, that is, his ability to

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better his condition, has been exactly in proportion as he has been able to scale the mountain, or to blaze a path through the forest, or to cross the river.

His progress has been in proportion to his ability to move himself from an unfavorable location to a more favorable one; to his ability to transport himself and his weapons or utensils from a place where unfavorable conditions surrounded him, to a spot where Nature better rewarded his struggle for existence.

In addition to the ox and the horse, primitive man domesticated the camel, and crept out over the desert. He boxed his raft, turned his poles into paddles, and his paddles into oars. From the time that man learned to trust himself upon the water, the waterways have been the highways of civilization.

It was much easier to float down stream or to pole or paddle up stream than it was to attempt to break through the heavy vegetation that bordered the streams. And, as we shall see, from that time down to the development of railroads, population and civilization has stayed close to the water.

The Phœnicians, who occupied the shores of

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the Eastern Mediterranean for several hundred miles along the coast, have left no trace of their civilization beyond the foothills only six to a dozen miles inland from the sea.

It is hard for us to realize how the mountains and hills, the rivers, the forests and deserts opposed and obstructed the migration and movement of early people. The limitations pressed upon primitive man by Nature have expressed themselves in some of our profoundest similies.

The River of Death expresses, as nothing else could, the limitation of the river and the impossibility of returning after the river was once crossed. The search for a better land beyond the river to which those who had passed over had gone, expresses what they could not understand in terms of the most important thing in their lives.

The House of Osiris, the paradise of the Egyptians, lay west across the desert sands. The Islands of the Blessed lay in the Western Sea beyond those that living Greeks had found and the Elysian Fields were just beyond.

It was in the forests of the West that the Hebrews located their Valley of the Shadows and the Indians looked westward for the

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Happy Hunting Grounds.

It is hard for us to realize the isolation of these early communities. The Babylonians never got out of the Valley of the Euphrates. The Egyptian civilization was confined to a ribbon along the banks of the Nile. The Phœnicians held barely a landing place on the shores of the Mediterranean.

If your attention has never been called to it before, you can not have realized the important part that even primitive transportation played in the development of the civilization of that world that looms so large in our historical horizon.

The progress of the Israelites northward stopped at the foot of Mount Herman and never really extended beyond the Jordan; from Dan to Beersheba was less than 150 miles, while from Jordan on the east to Joppa on the sea, was less than 50 miles. The Kingdom of Judea, which flourished after the secession of the ten tribes, is only 50 miles square.

The flight from Bethlehem into Egypt is barely 200 miles; and the Wilderness of the Wanderings, where the Hebrews hid out for forty years, is less than 100 miles across at its

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greatest width. And Mount Sinai, which marks its southern point, is barely 200 miles from the Promised Land.

Greek progress north, even in their tiny peninsula, was stopped by Olympus. The extreme breadth of the Peloponnesus was about one hundred and forty miles, or the width of the State of Indiana, while its extreme length was about two hundred miles. Yet, within these limits, with a superficial area less than two-thirds that of the State of Indiana, there were six independent commonwealths; while north of the peninsula, a territory one hundred and fifty miles north and south by two hundred and fifty miles east and west, was divided among no less than nine independent commonwealths.

In other words, Achai, Attica, Boetia, Doris, Elis and the other Greek States, occupied, each of them, a territory about the size of one of our good-sized counties. And, remember, that these different Grecian commonwealths had each an individuality of its own, with a considerable variation both in their spoken and written tongues.

Similar conditions exist today in the so-called Balkan Peninsula, where a race practically sim-

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ilar in blood and ancestry, and with language derived from the same source, are still so unintelligible to each other that they find themselves divided into half a dozen small kingdoms.

When William the Conqueror invaded Britain, he found it divided into twenty separate kingdoms, with great diversity not only of spoken but of written languages. It is hard for us to realize that it was not until the beginning of this last century that increased means of transportation and communication have brought about the diffusion of the English tongue, and the practical disappearance of the Welsh and the Gælic, of the Scotch and the Irish.

Had it not been for our genius for transportation, the English tongue would certainly have not reached beyond the Mississippi, while it is probable that in the region between the Atlantic Coast and the Mississippi we should have had some half-dozen different nations.

The myths of all the races begin with the search on the part of their mythical ancestors for better locations, and relate the wanderings that led them into that better country that they

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have since occupied. The Egyptian myths begin with the wanderings of Osiris, until he established himself and his people in the fertile Valley of the Nile.

The Chinese traditions begin with the wanderings of their ancestors until, under the leadership of Fu Hi, they came down along the course of the Yellow River into the great alluvial plain that is now the heart of China.

Abraham wandered about Asia Minor, seeking pasturage for his flocks and herds, and his great-grandchildren fled into Egypt to escape the famine. Afterwards, they wandered for forty years before they discovered the land that flowed with milk and honey, and the lost ten tribes were those that were not content even with the Promised Land when they found it, and kept on looking for a better one.

The Phœnicians, driven from the coasts of Tyre and Sidon, when the Israelites, under Joshua, occupied the Promised Land, sailed west to found a new Tripoli and Carthage. From the coast of Phœnicia, Cadmus carried letters and literature into Greece, but Cadmus is simply the East, and the story is but a record of the transportation into Greece of the art of

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writing that came to them from that direction.

After Cadmus, Hercules traveled westward to the end of the world, and there set up his pillars to mark its boundaries. The Argonauts sailed in search of the Golden Fleece, and the wandering of Ulysses are the epic story of the primitive Greek's struggle with Nature.

The expedition against Troy gives Homer an opportunity to name a thousand ships with their captains; and Aeneas fleeing from the victorious Greeks, crept along the shore of the Mediterranean, until he found the hospitable hills of Italy. The White Bull that bore away Europa was only a ship whose wind-filled sails rounded out like the sides of a fat ox.

The Hebrews, though they knew how to make bricks without straw, had no knowledge of the sea, and instead of sailing down the Nile and along the coast of the Mediterranean up to Joppa, laboriously tramped over the desert that lay between Cairo and Palestine.

When Solomon undertook to build his temple, it was his father's friend, King Hiram of Tyre, one of the last of the Phœnicians, who sent to Solomon ships and servants *that had knowledge of the sea.* They floated the cedars

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of Lebanon in rafts down to Joppa from whence they were borne by the Israelites to Jerusalem; and it is recorded in Chronicles that these ships of King Hiram's sailed to Ophir and brought back four hundred and fifty talents of gold and precious stones and strange woods, out of which were made new and wonderful things, the like of which had never before been seen in the Land of Judea.

The benefits of this early trade so impressed Solomon that he employed the ships and servants of Hiram, and once every three years the fleet made a trip to Tarshish and back, bringing gold and silver and ivory and apes and peacocks, so that silver became in Jerusalem as the stones in the street; and Solomon passed all the Kings of the earth in riches and wisdom.

For awhile, the world was practically divided between two great races, one of which controlled the land, by reason of its ability to travel over it on horseback; and the other, the rivers and sea and the land that bordered thereon, by reason of their skill in boat building.

Heroditus relates that the Phœnicians built a fleet on the Red Sea and sailed around the

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South Coast of Africa, returning by way of the Pillars of Hercules—the Straits of Gibraltar —but Heroditus, while recording the story, refused to believe it, because, he says, in reporting the course of their journey around the shore of Africa, they declared that they went so far south that they saw the course of the Sun in the Heavens lying to their North; and this, the historian declares, is so incredible that he refuses to accept the rest of their account of their voyage. Heroditus, thus, by his incredulity, records the very fact that proves the truth of the Phœnicians' account of their voyage.

Some one has called attention to the fact that a people, busy with material things, engaged in subduing the wilderness and conquering Nature, has no time left, after the securing of the necessary food and clothing, for the development of intellect. Until this work is done that there is no time for the cultivation of literature, and the records are crude, simple, coarse and direct.

Not until Nature has become so generous as to leave the race leisure, do those niceties of style develop that make literature. And it was in Greece that Nature seems, for the first

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time, to have been so generous with man as to give him this opportunity; so it was here that a civilization was developed with a literature of beautiful and sonorous words, and here that there was first found leisure for metaphysical thought.

But the civilization of the Greeks, supreme in its day, was limited to its small Peninsula and to such nearby islands as they were able to reach with their primitive boats. Thucydides records the fact that until the expedition of Xerxes the Greeks used only small open boats, and that it was not until they had been compelled for self-protection, to build and equip a fleet to oppose that of the Persians, that they learned the importance and necessity of navigation.

Their first efforts, after the repulse of the Persians, were to copy the decked vessels propelled by banks of oars that were used by the Persian invaders. But their limitations on the sea become apparent to us now, when we realize how near Italy is to Greece, and yet know that Italy was discovered not by Greeks going westward, but by the Carthagenians drifting north.

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The civilization of Rome developed slowly in the same way. With its growth and population and its increase in trade, it came more and more into communication with the surrounding countries, adding to its own civilization what it was able to assimilate from the nations with which it had communication and traffic.

And yet how primitive these means of communication were is proven by the fact that in spite of its physical nearness, it took five hundred years for the intellectual and artistic spirit of Greece to penetrate Rome.

While Greece was spending her energy in art forms, Rome was building roads. First throughout her own country; so that, though the Romans occupied a territory several times larger than that of the Greeks, there was little variation either in the Roman tongue or the written language. It was this that gave the Romans a homogeneity that was never possessed by the Greeks—a sense of national unity.

But the Political Conquest of Greece by the Romans was due to the Roman Triremes, the swiftest ships that had been built in the world

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up to that time. Driven by their triple banks of trained rowers, they swept the Mediterranean and carried the Roman Legions from Alexandria and Byzantium to the Pillars of Hercules; while back to Rome herself, they brought the peoples, products and vices of the conquered nations.

The art of shipbuilding was held so highly by the Romans that serfs without property rights or testamentary capacity, were, if able to build or navigate ships, given their liberty with the right to hold office and to dispose of their property by will. The Roman fleets became so numerous that they were said to have made bridges from Rome to all the Roman provinces: Cicero declared that: "He who holds the sea is the ruler of the world." In the phrase "Carthago Delenda Est," Cato but voiced the Roman protest against their only rival on the seas.

Have you ever wondered, in reading the History of the Punic Wars, how the Carthagenians happened to be crossing the Alps and attacking Italy from the north? If you will look at your maps, you will see the answer. It was safer for the Carthagenian fleets to coast

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along the shores of Africa, across the narrow Straits of Gibraltar, and along the Eastern slopes of Spain and Southern France, than it was to attempt to cross even the narrow sea between Carthage and Rome, without the sight of land.

The Romans never advanced beyond the oar as the means of propulsion, and while their Triremes could sweep the seas, they could not cover the land, and so the Roman Legions built roads through every country which they conquered in Europe, North Africa and Asia Minor, and over these roads with the swift Triremes running between their ends and Rome, was Roman civilization scattered over the then known world, and the Latin tongue made practically universal among those who pretended to learning and education. It was this that made the Latin language the one in which learning was preserved and transmitted through the so-called Dark Ages, until the revival of learning began.

But when the Roman Legions, worn out by fighting and road building, rested and became degenerate through plunder and luxury, when the Roman Legions ceased to be Roman and

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became bands of hired fighters who shared in the spoils formerly given to Romans alone, then the Goths, from which these mercenary legions had been recruited, looked longingly toward Rome and finally poured back into Italy, over the very roads that the Roman Legions had built, into their country.

Had the Goths been compelled to fight their way through a wilderness, it is doubtful whether they would have ever reached Rome. But the Roman-built roads facilitated their progress, and no longer guarded by Romans but by Legions made up of their brothers, they flew to the sack of the city that had called them to her service. And the Legions, in sport, raised favorite after favorite to the throne of Augustus. Greek, African, Spaniard, Illyrian, succeeded each other. Diocletian had been a Dalmation slave, while Constantine the Great was the son of an Asiatic herdsman and a Dacian captive.

The natural barriers to travel, and the difficulties in the way of communication against which the Legions of Rome had struggled, operated to isolate the several families that peopled Europe, and so permitted in Europe, as

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it had before in Asia Minor and Greece, the growth of half a dozen different civilizations and languages on one small continent; each civilization limited to the community lying within some natural zone or region marked off by mountain ranges, rivers and sea.

Europe did not wake until slowly increasing population pressed out and turned the forest trails into highways, along which came the interchange of ideas between these races and nations; and it was the comparison of their own conditions with the conditions of others that quickened the intellectual life of the people of Europe and brought on the Renaissance.

The Beginning of Modern Civilization.

Buckle declares the greatest forces in the civilization of Europe to have been the influence of gunpowder, the invention of printing, and the discovery of political economy, but he fails to show the way in which these were brought into Europe.

About 650 A. D., during the reign of the second Emperor of the Tang Dynasty, a fleet of Chinese junks sailed around Indo-China and India into the Persian Gulf, along the coasts of Arabia and into the Red Sea. From

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this expedition the Arabs first learned the use of the compass, and this was transmitted by them to the Mediterranean sailors.

The Decline of Constantinople really began in the ninth century, when coasting no longer became necessary, for, by the use of the compass, the trade of the Orient began passing directly from Bagdad to the cities of Italy. Up to this time all Mediterranean traffic had hugged the shores, carrying neither provisions nor water for their voyage, but trusting to obtain these on land at short intervals.

The spirit of adventure in Italy did not die with the fall of Rome, and Italian slave dealers and merchants roamed the then known seas, gradually penetrating farther and farther into the world unknown to them.

In the latter part of the thirteenth century some Venetians named Polo returned from the country beyond Ind. They had followed back to their homes the conquering hordes of Ghengis Khan which had so recently impinged on Europe. Upon their return, the Polos gave the Venetians their first account of firearms, printed books, paper money, and other strange things. The Polos made a second trip across

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Asia to China, returning by sea around India. Following their return, they engaged in wars between Venice and Genoa, and the younger Polo, Marco, was captured by the Genoese. During his imprisonment he dictated to a fellow prisoner an account of his journeys.

The importance of the narration of Marco Polo is shown by the fact that, although it was first written about 1298 or 1300, almost one hundred manuscript copies of it, in the different tongues of Europe, are preserved to us to this day.

Originally written in French, it was soon translated into two or three Italian dialects, and within ten years, during Marco Polo's lifetime, it was translated into Latin at the request of the priests of one of the largest monasteries in Italy, in order that it might be preserved as a classic for all time.

In 1403 and in 1426 Chinese fleets again appeared in the Red Sea. One of these expeditions brought a quantity of Chinese porcelain of this period to Mecca; and some of this porcelain was, in 1487, presented by the Sultan to Lorenzo de Medici.

In 1426, the year that the last Chinese Ex-

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pedition appeared in the Red Sea, Prince Pedro of Portugal, being on a trip to Venice, was presented by the seignory, or government, of Venice with a Latin copy of Marco Polo's book; and although this particular manuscript seems to be lost, there is in existence a Portuguese manuscript that recites that it was translated from Prince Pedro's Latin copy.

The importance in which Polo's account was held is also shown by the fact that a German translation of it was among the first books ever printed. It was printed in Nuremberg in 1477. Another edition was printed in Augsburg in 1481, and a Latin edition, without place or date, was printed—probably in Venice about 1485.

In order to show the close connection between Polo's account of the development of the art of navigation and the discovery of America, it is only necessary to call attention to the fact that one of the most important chapters in Polo's book is devoted to the art of shipbuilding and navigation as practiced by the Chinese, which was declared by him to be excellent beyond anything that Europe had known.

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This was the foundation of the Portuguese experiments in navigation, following the carrying back to Lisbon by Prince Pedro of a copy of Polo's book. A copy of the first Latin edition of Polo's book was a prized possession of Christopher Columbus. This identical book is now in the Colombena at Seville, and contains over one hundred autograph notes in Columbus's own hand, showing how closely the great navigator had studied it.

Historians have commented on the fact that European history does not record the name of the man who invented gunpowder; but there is good reason for this. He never existed! Those Venetian travelers who brought back Chinese guns and gunpowder, brought back with them the formula for making gunpowder; and when Europe adopted firearms, it adopted not only the gunpowder that came from China, but even the form and shape of the Chinese gun as it had been in use by the Chinese for hundreds of years.

The earliest weapons of European manufacture, preserved in the Museums of Europe, are exact copies of those old Chinese firearms whose shape the Chinese, with their strange

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persistence, have preserved even to this day.

The same thing is true with the art of printing. Those first Chinese books brought back to Venice were passed around as curiosities; and doubtless many of them went northward from Venice, in some Italian caravan, up through the mountain passes into the German plain; until they became familiar to the learned men of Augsburg, Ulm and Nurnberg; and all that Faust and Gutenberg ever did was to appreciate the possibility of adapting this Chinese art to their own language.

It is proof of the source of their inspiration that their first books were printed in a German type that approximates as nearly as possible the size, shape and modeling of the Chinese character used in the books from which they got their ideas. While political economy was developed only after travel had called attention to contrasts and given sufficient data for comparisons.

The study of Chinese civilization is particularly interesting and suggestive to us in the consideration of the present matter, for the reason that we have here a civilization as old, or older, than the Egyptian—highly developed

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along its political and ethical lines, but so stagnant in matters of physical condition that we can find there preserved for us to this day conditions that approximate those that we find preserved for us in Egypt only in the sculptures and pictures of rifled tombs.

The Chinese speak of their first ancestors as "pastors," recognizing their pastoral character and nomadic life, but soon after they occupied China they turned their attention to the development of the means of transportation and inter-communication. In no other country have the smallest rivers and streams been utilized as they have in China. The smallest boats, drawing but a few inches, are poled to the headwaters of every creek. In addition to this, the Chinese began early the building of their wonderful system of canals. Every succeeding dynasty extended this system of canal building as much for military purposes as for trade, for carrying the armies of the invaders and bringing back the tribute rice from the conquered provinces. Forty canals across the United States from the Atlantic to the Pacific coasts and fifty more from our northern boundaries to the Gulf would not suffice to equal the

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canals that the Chinese built to carry on their internal commerce.

Draper attributes the remarkable homogeneousness of the Chinese to the increased intercommunication that was so wonderfully developed by their canal system, but this means of transportation and communication was slow, and while it has given them a single written language throughout their country, it has not sufficed to produce a universal spoken language, for the slowness of this transportation, amounting to scarcely thirty or forty miles a day, has succeeded only in producing uniformity of language along the main lines of their great rivers and chief canals. As soon as you move at right angles to these main lines of traffic the isolation of the people makes itself felt and you have a new dialect for practically every hundred miles. It has been estimated by Professor King that there are 200,000 miles of canals, or improved waterways, in China; or, in other words, the Chinese in a country only one-third the size of the United States, have built almost as many miles of canals as we have constructed miles of railroad in our own country.

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The canal system in China was a great incentive to the development of internal commerce and traffic and it resulted in the Chinese early reaching that development of commerce and that high respect for property in transit that gave the Chinese banknotes, letters of credit and bills of exchange, a thousand years before they were known in Europe. It was the Chinese respect for property, and this early development of commerce, with all that that term means, that gave the Chinese their attitude toward war, and resulted in the practical abolition of war in China during the centuries when the nations of Europe were ravaging and plundering each other. It resulted, too, in that enormous growth of population which has made the great problem in China the equalizing of the great supply of labor that has existed in every community with the limited demand for it.

As their civilization developed, population grew and a constantly increasing supply of labor found a steadily decreasing demand for it, until wages were reduced to the lowest possible point at which human existence could be maintained, but with all the cheapness of

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human labor the cost of transportation in China has been, and is, a terrible tax upon the business of the country and upon the cost of living, and there are physical limitations which are hard for us to understand, comparable only with the difficulties of our early wagon trains crossing the plains in carrying enough to supply themselves for the journey without attempting to carry any surplus for trade.

I want, if possible, to translate the cost of transportation by these primitive means into Twentieth Century terms, and see if I can make you understand what transportation and its cost means to civilization. The common Chinese cart with two mules only undertake to haul a thousand pounds a distance of twenty miles in a day at a cost of $1.25. This is a cost per ton-mile of 12½ cents.

In China a single man with a pole and baskets will carry eighty pounds about twenty-five miles a day at a cost of ten cents, or at the rate of 11 cents per ton-mile.

Two men with a wheelbarrow will move from three hundred and fifty to four hundred pounds a distance of eighteen or twenty miles in a day at a cost of 26 cents, or about 8 cents

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per ton-mile, and camel trains or pack animals are little cheaper.

Compare this, if you please, with the freight charges of our great trunk lines, say the Saint Paul, with an average charge of six and one-half mills per ton-mile, or the New York Central and Pennsylvania systems with average charges of only about six mills per ton-mile. The average of all our American railroads is less than 1 cent per ton-mile, while on some commodities it is as low as three mills.

Remember that this Chinese cost of transportation—twelve and one-half times greater than the average rate of all American railroads and twenty times greater than that of some of our great systems—is paid by a people whose wage scale and standard of living is less than one-twentieth that of our own. So that the actual proportionate cost—that is cost in proportion to ability to pay—of such transportation to the Chinese people is from two hundred and fifty to three hundred times greater than the cost of our transportation is to us.

With this explanation of the development and cost of transportation in China, turn back to Europe and note the condition in England

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only two hundred years ago.

Draper in describing the condition of England in the reign of Queen Anne says: "Nothing more strikingly shows the social condition than the provisions for locomotion. In the rainy seasons the roads were all but impassable. Through gullies, half filled with mud, carriages were dragged, often by oxen, or when horses were used, it was a matter of necessity to drive half a dozen of them.

"If the country was open the track of the road was easily mistaken. It was no uncommon thing for persons to lose their way and have to spend the night out in the air. Between places of considerable importance the roads were sometimes very little known, and such was the difficulty for wheeled carriages that the principal mode of transport was by pack-horses, of which passengers took advantage, stowing themselves away between the packs.

"The usual charge for freight was *fifteen pence* (30 cents) *per ton-mile.*

"It was not until the close of the century what were termed 'flying coaches' were established; they could move at the rate of from

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thirty to fifty miles in a day. Many persons thought the risk so great that it was a tempting of Providence to go in them."

Now it is significant that the cost of transportation in England here disclosed is practically the identical cost of transportation shown in China under the same sort of conditions. In China where the wage scale is practically 10 cents a day, it costs 10 cents per ton-mile to move freight; or in other words, the average cost per ton-mile to move freight is the price of one man's work for one day.

At the time of Queen Anne when, as Draper says: "The cost per ton-mile of moving freight was 15 pence, or 30 cents," the average wage of labor was 1 shilling, or 25 cents, so that in England the cost per ton-mile was a trifle more than the wage of one man for one day.

You have seen how under primitive conditions transportation is simply human labor, and that the cost of transportation is simply the cost of human labor necessary to carry the product to market, and you have seen the successive efforts made to relieve human labor of this burden, and this brings us to the beginning of the final stage in the development of

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the *means of transportation.*

The world has conceded to the Chinese the invention of gunpowder and the invention of printing, to both of which the civilization of Europe is under the greatest obligation. But I am going to claim another thing for this ancient Empire, and that is the discovery of the *art of navigation.*

It is hard to understand the primitive condition of sailing as it existed up to the middle of the Fifteenth Century. Evelyn declares that: "At the time of the French invasion of Britain that there was not a pilot to be found who dared venture twenty leagues from land; that all commerce by boats, sneaked along the shores, and that the French captains would not even venture to cross the English Channel unless it was clear enough for them to see the other shore."

The world has conceded to China the invention of the compass, but students of civilization have overlooked the fact that the Chinese were the first race that learned to bend the wind to their will and sail into the teeth of the gale. The sailors of Europe had coasted before the wind in floating up, or down, the Mediter-

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ranean, but the Chinese seamen for centuries had been sailing to distant islands *and coming back.* As early as the Seventh Century Chinese mariners had sailed around India into the Red Sea and made the Arabs acquainted with their compass.

The seagoing junks of the Chinese that were seen by those Venetian travellers during the Thirteenth and Fourteenth Centuries, were stauncher than any of those that Europe had built up to that time. And the discovery of these boats, together with their compasses and their art of sailing into the wind, were brought back to Europe by those same travelers that brought gunpowder, Chinese guns and the art of printing.

It is no mere coincidence that the ships of Columbus that sailed westward to find the new world, and those of De Gama that sailed around Africa to India, were built after the models of the Chinese oceangoing junks, less than fifty years after Faust and Gutenberg had adapted the Chinese art of printing to the German alphabet.

The success of the Portuguese in the art of navigation stimulated the Spanish to great en-

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deavors and the caravels in which Columbus crossed the ocean rapidly grew into the gallions which brought back the treasures of the New World to Spain. This mastery of the art of navigation gave Spain the commanding place in the world, with Portugal only a scant length behind. France and England looked on the commerce and wealth of Spain and Portugal with envious eyes, but it was not until English seamen conceived and built the British Frigate in the latter part of the Sixteenth Century that England was able to dispute the leadership of the Spanish and the French.

The Spanish Gallion was huge and seaworthy, but clumsy and unwieldy, while the British Frigate was the easiest handled ship and the best sailer that had yet been invented. It is related in history as an illustration of the superiority of the British Frigate over the Spanish Gallion, that one English Frigate with a crew of only one hundred and eighty men met a Spanish fleet of fifty gallion which it fought singlehanded for twenty-four hours, sinking four of the Spanish ships and causing a loss to the Spanish fleet of seven thousand men, finally escaping herself with a loss of

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only ninety—or about one-half of her own crew. It was this development of shipbuilding and mastery of the art of seamanship that enabled the English to wipe out the Spanish Armada, defeat the French Navies and establish the British Empire around the world.

Buckle states: "That the advance of civilization depends upon three things; first, the knowledge of a country's ablest men; second, the direction which that knowledge takes, or the subjects upon which it is expended, and third, the diffusion of that knowledge." But Buckle failed to realize, or to see at all, that all of these things are dependent upon the development of transportation and the means of communication.

The knowledge of a country's ablest men depends upon their ability to travel over the known world and discover those things that have escaped the observations of others. And the direction which that knowledge takes depends upon the new inclination given to it by the observations and discourses of these travelers; while the diffusion of knowledge itself absolutely depends upon the facilities for transportation.

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The ablest men of European countries had by the middle of the Sixteenth Century practically the same amount of knowledge, for the multiplication of books during the seventy-five years that followed the introduction of printing into Europe had placed at the disposal of every European student practically all the knowledge that was the possession of any.

But the diffusion of this knowledge had been slow. It had naturally followed the existing lines of travel. Beginning in Italy, whose travelers had brought back these new discoveries from Arabia, and the Orient, it had crept north into Europe; first, from Venice, through Augsberg and Nurnberg, and from thence over to the Rhine and then down the Rhine past Frankfort and Mayence to the Lowlands, and thence from Amsterdam, Antwerp and Rotterdam across to England. Another line crept from Genoa up the Rhone Valley to Geneva, and thence across into France, Dijon and Paris.

The direction of this knowledge and of its students was influenced first by the character of the material then at hand, and second, the influence and position of the Church. There

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had come to be a general feeling that physical conditions could not be improved and that the best that could be done, was to save the souls of poor humanity. It has always been, more or less, of a religious principle with mankind to regard local conditions as perfect, or at least as definitely or finally settled, and as having Divine sanction.

The Church encouraged this view because it perpetuated its influence and power. The Church had been the possessor of such learning as existed, and the temporal power of the Church had placed its priests in control over the social and political conditions of the people.

It was, therefore, impossible to discuss social or political conditions without reflecting upon the Church's management of them, and it was this that made heresy out of all the suggestions for the improvement of the social and political conditions of the people. And so it was that reformers of that day habitually adopted the style of putting their reform tracts into the shape of books of travel with accounts of the wondrous customs, freedoms and advantages enjoyed by other people in imaginary lands.

At this time in Europe—populations had

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become fixed, the people were attached to the soil, and not only were the lines sharply drawn between nations and races, but within the nations themselves the lines were sharply drawn between classes.

Land had been the representative of authority and the source of power, and a descending scale of limited proprietors had been established. Under this system every man had a place assigned to him. The possession of land was a trust, not a property. Kings ruled by divine right; barons held their land in fief from the crown, and the common people in lease from the barons.

The Feudal system was a mere expression of the physical impossibility of securing the allegiance of people to a King or Over Lord too remote to be ever seen. It prevails in some degree in every country, while the means of communication are limited and slow, and it disappears gradually in exact proportion as these increase.

It was at this time that the seagoing vessels that had learned to tack in the face of the wind discovered America, and sailed around the Cape of Good Hope. The returning adventur-

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ers from the West brought back the gold of the Montezumas and the Incas. Those following the new route to India and the Orient brought back silks and jewels. Trading companies were established to finance expeditions to the West and East Indies. With the discovery of an easy way around Africa, the British and Dutch ports became nearer to both the East and West Indies than were the Mediterranean ports, and the trade that had formerly come to Venice, Genoa and Marseilles, rapidly faded away.

Men were unsettled not only by the rumors, but by the knowledge of enormous fortunes rapidly gained in foreign adventure, and commerce was beginning to disturb the foundations on which all previous political conditions had been standing. Society was disrupted; the spirit of loyalty to the old regime faded before the dreams of advancing self-interest that promised so much for the individual.

For the first time in history a premium was put on speed of carriage, and kings fitted out fleets of fast sailing ships to take possession of as much as they could get of this new world.

From the first, the problem of transporta-

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tion was the paramount one with the discoverers and the colonists. First, of transportation from the old, helpless and discouraging conditions to this new world, and second, as soon as the first colonies were established, the problem of transportation, ever westward, into the wilderness where each dissatisfied individual hoped to find as much of an opportunity for himself as the first comers had found where they first landed.

The lands which these colonists seized and settled upon cost them nothing but the expense of reaching them. But as soon as the colonies were settled, these lands began to take on value, not in proportion to their richness, but in proportion of their accessibility. The first colonies were established, not at points where the richest lands were found, but at places where suitable harbors could be established.

And it was natural with the then existing methods of transportation, that the further extension of the colonies should be, as they were, along the water courses. Massachusetts Bay Colony extended up the Charles River. New Amsterdam crept up along the shores of the Hudson and then westward up the Valley of

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the Mohawk. Pennsylvania up along the Delaware and the Susquehanna, Maryland up the Potomac, Virginia up the James and Georgia up the Savannah to Augusta.

The rich lands that lay between these rivers were neglected because it was of no avail to raise twice as much tobacco on these inland farms, if its value was consumed in reaching the river. Land along the rivers brought from twenty dollars to forty dollars per acre; that five or ten miles back from the river brought only ten to twenty dollars per acre; that from ten to fifteen miles back brought only five to ten dollars per acre, while back of fifteen miles land was practically unmarketable and was offered freely at twenty-five cents per acre.

In order to be of value, lands must be accessible and their products transferable to market at a cost that shall not consume the value of the product in transportation.

At the time of the French and Indian War the proposition to acquire Canada was opposed by many English on the ground that it was truly useless, as, in fact, were the western parts of the colonies already held. They agreed that there was a certain distance from the sea in

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America beyond which the expense of carrying put a stop to the sale and consumption of English manufactures, and that this distance was limited to two hundred miles, or to the Appalachian Mountain Range; that to permit the colonies to extend their settlements beyond that distance would not only render them useless to England, but, through the difficulty of commerce, would compel the inhabitants beyond to manufacture for themselves and so become independent. It was Benjamin Franklin who answered this objection. In 1760 he declared "That the great inland rivers and lakes of America made this western country accessible, except for the shortest of portages." "It was only necessary," he said, "in order to reach Lake Ontario from New York, to make a short portage of twenty-seven miles; that from Lake Ontario to Lake Erie the land carriage around Niagara was only twelve miles, and that from Lake Erie there was 2,700 miles of lake and river passage without obstruction; that from Presque Isle on Lake Erie it took but fifteen miles of a portage to reach the headwaters of Beef River, a branch of the Ohio, which made accessible thousands of miles of inland rivers

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through Ohio, Mississippi and the great rivers that run into them." He further called attention to the fact that Russian iron was brought three thousand miles by land and water from the heart of Siberia, and that it had been found worth while to keep up a mercantile connection between Peking and St. Petersburg over a desert of seven thousand miles.

It is a fact not generally known that in proportion to our population, the early Americans were the greatest canal builders the world has ever seen. As soon as the river banks were pre-empted, the colonists began improving the smaller waterways and building canals, for there was ever before them the enormous profits resulting from making accessible the rich lands of the interior.

The three states of New York, Pennsylvania and Ohio, with the Federal Government, expended upwards of $150,000,000 in the construction of canals between the years of 1800 and 1826. The Erie Canal alone, from Albany to Buffalo, cost in excess of $50,000,000. While from the lake two separate canals were constructed south across Ohio to the Ohio River.

Before the Erie Canal was opened, New

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York and Boston were equal in exports, but both were behind Philadelphia and the Virginia ports. Philadelphia led in population and manufacturers, but it cost $100 per ton to bring freight from the interior down to tidewater. The Erie Canal, from the Hudson River up the Mohawk Valley to the lakes, was opened in 1825 and freight rates dropped at once to $10 a ton from lake ports to New York.

Traffic flowed to New York as naturally as water flows down hill, and within six years after the opening of the canal the exports of New York were three times greater than those of Boston and five times greater than those of Philadelphia or Baltimore. It was the Erie Canal with the commerce that it developed that built up the string of great cities across New York, that has given the State of New York the lead in the number of large cities over every other State in the Union. As the result of building these canals the population of the States through which they were built increased enormously at the expense of their neighbors who were without these means of transportation.

Immediately after the Revolution, some ex-

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periments had been made on the Potomac River in which George Washington himself was interested. It was undertaken to install a sawmill engine on a barge, and use the saw machine to drive two sets of paddles. Other experiments with the use of steam to propel boats were tried on the Delaware, and in 1807 Fulton made the steamboat a commercial success for the first time, on the Hudson.

This discovery gave a great impetus to the interior States and gave added value, not only to the canals that had been built, but to our inland waterways. Within five or six years after the first successful steamer had plied the Hudson, far greater and finer steamers were going down the Ohio from Pittsburgh, Cincinnati and Louisville to New Orleans, and up the head-waters of the Mississippi and the Missouri.

Had the discovery of steamboats been made by the French before 1800, the Louisiana Purchase would never have been made and the Mississippi would probably have been the boundary between two nations; one on the East speaking English, and the one on the West, French.

In 1790 the State of Virginia had three-

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quarters of a million population. Pennsylvania only a little over four hundred thousand, and New York State only three hundred and forty thousand, while Ohio had only a few hundreds.

By 1830, while Virginia had increased to 1,200,000, Ohio had grown from nothing to almost 1,000,000, Pennsylvania to 1,350,000 and New York State to 2,000,000. This was due almost entirely to the neglect of canal and road building by Virginia and the other Southern States, while these Northern States were so busily engaged in their construction.

The backwoodsmen of Tennessee and Kentucky had almost no trade except the small barter among themselves. All the articles of merchandise that came to those regions were transported in wagons from Baltimore and Philadelphia over bad roads and across the mountains. The arrival of one of these store wagons was sure to excite interest—the settlers from far and near gathered around eagerly—inquiring if the trader had brought out this, or that article, and what was the price, and these were enormous. A dollar a yard being frequently charged for calico that did not cost

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over ten cents in Baltimore or Philadelphia.

It is difficult at the present time to realize the difficulties under which these States labored from the period of their first settlement down to the cession of Louisiana in 1803. With a soil and climate admirably adapted to the production of the most valuable agricultural staples of the country, it was useless for the people to cultivate their rich soil beyond what was needful for their own consumption. *There was no market for any surplus—no possible price at which any kind of produce might be sold that would pay the expense of transportation to Baltimore,* the nearest Eastern market by a land carriage of many hundred miles over mountains and on roads that were often hardly passable with empty wagons.

The Mississippi, the natural channel of commerce for the entire West, was closed. The banks of that river on both sides for several hundred miles, including the port of New Orleans, were in the possession of Spain, whose avowed policy was to cut off the Western people from the navigation of that river. The only two articles produced in Tennessee and Kentucky, at this time, that justified the ex-

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pense of land carriage to the Eastern States, were saltpetre, which was found in abundance in the mountain caves, and ginseng, the root which even then was in such demand in China that it could be transported overland to the coast and there exported to China at a profit.

The genius of our American people in matters of transportation was early recognized. Murray, an English authority, in 1829, stated that: "Commerce is a branch for which the American people have shown a peculiar aptitude, and they have pursued it with extraordinary briskness and enterprise. American vessels," says he, "are seen along the coasts of all the three continents and they have rivalled or supplanted the great European Powers, even in the distant markets of China. They hesitate not in little barks of sixty or seventy tons to cross the Pacific. The bold spirit of a Republican Government prompts naturally to mercantile enterprises, and obliged by their situation to obtain all the luxuries of life and all the finer manufactures from across extensive oceans, they were led easily into the path of maritime adventure. The carrying trade which properly belongs to a much more advanced

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stage of national progress, has been thrown into their hands by the general wars of Europe and has rendered theirs almost the only neutral flag that was to be seen on the European Seas."

In the year 1817 the whole commerce from New Orleans to the upper river country was carried on in about twenty barks, averaging a hundred tons each, and making but one trip in the year. On the upper Ohio there were one hundred and fifty keel boats of about thirty tons each which made the voyage from Pittsburgh to Louisville and back in two months, or about three round trips per year. In 1842 Congressman Giddings called the attention of Congress to the fact that: "The State of Ohio alone that year built and launched on Lake Erie and the Ohio River vessels with a larger aggregate tonnage than all the Southern States combined with Missouri and Arkansas besides."

But the Southern element in Congress was not only indifferent to the development of transportation in their own States, but was indifferent to the plea of the Northern States for Congressional aid therefor.

The Southern States with slave labor that cost little, had no object in relieving that labor

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of its burden, so they built not only few canals, but few roads, while the free labor of the North, seeking to get the most that it could for its labor, concentrated its efforts upon relieving itself from the burdens of transportation. *At the outbreak of the Civil War there were more miles of railroad in a single Northern State than there were in all the South.* The Northern armies could be transported from Vicksburg to Washington easier than a Southern brigade could be moved from Birmingham to Chattanooga, and the triumph of the North was due, more than to any other one cause, to the superior transportation facilities possessed by the North and their control of the iron with which they built additional railways while the war was in progress.

The slave labor of the South cost nothing and so the Southerners did not feel the necessity of being relieved of the burden of primitive transportation, as did the free labor of the North. Legal Emancipation has been of small value, for intellectual and spiritual emancipation can be achieved only after physical emancipation has become an accomplished fact.

Ohio continued to grow, and although its

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Eastern boundary barely lapped Virginia's western, it had by 1859 reached a population of 2,000,000 against Virginia's 1,400,000.

In 1825 and 1826 some experiments had been made in a new method of transportation, and in the 30's and 40's a number of short lines of railroad were built, not as competitors with the canals and rivers, but as feeders to them. The Portage Railway was the first operated in America, but by 1850 it began to be seen that railroads as a means of transportation were destined to supercede canals.

In England, from the end of the Roman occupancy until the middle of the Eighteenth Century, practically no attention was paid to road building. After the lapse of fourteen centuries what was left of the Roman roads were still the best roads in England. In 1745 the lack of roads so embarrassed the government in its attempt to mobilize an army to meet the Pretender's Raid that the need of roads as a military necessity was impressed upon the British Government. Between 1760 and 1775 nearly five hundred Acts were passed by the British Parliament for the construction and improvement of roads.

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The closing decades of the Eighteenth Century were of the pack horse period, when coal was first carried about England from the mines at a cost of two shillings, or fifty cents, for a pack load. The Duke of Bridgewater built a canal with which to get his coal to Manchester, with the result that the cheapened rate for transportation started a boom, not only in the coal business, but in the canal business. Owners of pack animals thought that ruin stared them in the face; turnpike trustees declared that "There was not enough traffic for both land and water carriage," and when, in 1785, the McAdam roads enabled stage coaches to make a speed of eight or nine miles an hour, the Quarterly Review declared that: "The new method of road building would seal the doom of the canal." Yet in 1847 it was stated that there was no spot in England south of Durham that was over fifteen miles distant of navigable water and that over the most of the country the maximum distance from navigable water was actually less than ten miles.

In 1776 when our American Revolution broke out there was just one stage coach run-

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ning between London and all Scotland, and this coach, starting from Edinburg, made one round trip per month, taking six or seven days to make the four hundred mile trip in each direction—laying over a week at each end for repairs to the coach and to give the teams rest for the return trip.

In 1801 the Surrey Iron Railway Company was organized and received a charter for a small line to be operated by horses. The wagons used ran on four wheels from two to three feet in diameter and carried from twenty to fifty hundredweight. On the dead level a single horse pulled five loaded wagons, each containing thirty hundredweight of coal at the rate of four miles an hour—in all seven tons exclusive of the wagons, which weighed three tons more.

In 1803 an English engineer operated a self-propelled steam wagon over a country road, and the following year he successfully operated his steam wagon over a short strip of railway. It was not until the 10th of October, 1825, when the first railway train, hauled by a steam locomotive, ran over the Stockton and Darlington Railway, that railway service,

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as we understand it, truly began.

In an article in the "Scotchman" in 1825, an argument appeared in favor of railroads, in which it was stated that: "No single thing is so essential to the improvement of a country as sustained and easy means of internal communication. A large part of the price of commodities always consists of the expense of bringing them from the place where they are made, or raised, to the market. In improved districts this amounts only to a small percentage upon the first cost, but in rude or backward districts, unimproved with tolerable roads, it even enhances the cost of an article to three or four or even ten times the original cost, and, of course, either greatly lessens or entirely precludes their use. Coal, for instance, is not found within one hundred miles of London, and, before the construction of canals, could be sent cheaper from Gloucestershire by sea to Jamaica, than it could be sent by land in carts to London. In those days coal cost in London six pounds per ton ($30), a price which was nearly equivalent to a prohibition against the use of this kind of fuel. After the development of the canals, the cost

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of coal dropped to forty shillings (or about $10 a ton). In early days the roads were mere footpaths and goods were universally carried on the backs of horses, to these succeeded gravel roads for wheel carriages, and the latter were followed by canals. A horse put in a wheel carriage will draw upon a well-made road as much as four horses will carry on their backs, but when employed in working a boat on a canal he will perform as much work as thirty horses in carriages, or as one hundred and twenty pack horses. Railways are a much more recent invention than canals, and for peculiar purposes, such as conveyance of coal, stone, or other heavy commodities, they are decidedly superior. As a means of general communication they are cheaper in the first outlay than canals, and adapted to a greater variety of situations, but so long as horsepower has been the only power employed it may be doubted whether the balance of advantage is not in favor of canals. We are satisfied, however, that the introduction of the locomotive (steam power) has given a decided superiority to railways, and we hope, by and by, to convey some share of this conviction to the minds of

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our readers. The general use of railways and steam carriages for all kinds of internal communication offers prospects of almost boundless improvement, and is destined, perhaps, to work a greater change on the state of civil society than even the grand discovery of navigation."

On October 6th, 1829, the Liverpool and Manchester Railway held the first real test to decide upon the motive power of their future operation, and selected George Stevenson's locomotive, "The Rocket," which in the test had attained a speed of twenty-nine miles an hour. The Liverpool and Manchester Railway line was opened early the following year, and during this first year carried over 500,000 passengers. It must not, however, be supposed that the success of this line, by any means satisfied the public. The new system of transportation was attacked by eminent engineers, and by *Pro Bono Publico* in the public press; pamphlets were published in which it was solemnly declared that: "The noise of the railways would stop hens from laying and prevent cattle from grazing; that the poisoned smoke from the locomotives would kill song birds and game, and

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that all houses anywhere near the railways would be set on fire by the engines." It was urged that boilers would burst and blow the passengers to bits.

The Conversative Quarterly declared: "As to those persons who speculated on making railways general throughout the kingdom,—we deem them and their visionary schemes unworthy of notice," and further, in discussing a proposed railway between London and Woolwich, whereby it was proposed to shorten the time by stage coach one-half, the Review declared: "We should as soon expect the people of Woolwich to suffer themselves to be fired off upon one of Congreave's Rockets as to trust themselves to the mercy of such a machine going at such a rate."

But notwithstanding such warnings, the people turned to the new method of transportation. In 1833 charters were issued for the construction of lines from London to Birmingham and from London to Greenwich. In 1834 a charter was granted for the construction of a line from London to Southampton. In 1835 a charter was issued for the construction of the Great Western Railway. In 1836 for the

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London and Great Eastern, and in 1837, for the London and Brighton. The panic in 1837 and 1838 put a stop to railway construction, but by 1840 the railways already completed began to pay handsome dividends and it became apparent that the new method of transportation was no longer an experiment but a financial success and was destined to revolutionize travel and commerce.

Let us turn from England to our own country again.

The Boston Post Road from New York followed an Indian trail, that ran through pioneer settlement to pioneer settlement. It did not begin to be a thoroughfare until Governor Lovelace, of New York, established the first mail service between New York and Boston. He wrote a letter to Governor Winthrop of Massachusetts, telling him of his plan, and the aid that it ought to be in promoting friendly relations among the English Colonies. The first post rider left New York on his two hundred and fifty mile trip on January 22d, 1673, taking two weeks to reach Boston. He started on his return to New York at once, making the round trip within a month. For miles of

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the way there was absolutely no real road at all, nothing but the Indian trails through the forests.

In 1782 the first through coach service between Boston and New York was inaugurated. The journey occupying six days—the coach starting out early Monday morning and arriving at the other end of the line Saturday evening.

With the bettering of the roads that the stage coaches used the traveling of the post riders was accelerated, and it may surprise you to learn that Thomas Jefferson was something of a speed fiend himself. In 1792, while he was Secretary of State, he called attention to the fact that the post riders between Boston and New York were making only from thirty to fifty miles a day, and he believed that with relays of horses and men it was possible to travel one hundred miles a day, and to send letters from New York to Boston in two days and a half. The experiment was tried and found successful, so much so that the same experiment was tried with the coach traffic, and resulted in cutting down the time between Boston and New York to three days. Between

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1815 and 1820 considerable work was done in cutting out the curves and straightening the road, so that by 1821 a stage coach service was inaugurated over a new road that cut the distance from two hundred and fifty miles to two hundred and ten miles, and with the invention of the Concord coach, which with its swinging body was the acme of comfort for coach traveling, the time was cut down to two days.

But out in western Pennsylvania, Ohio and Indiana, the frontier conditions reduced the pioneers to the same old conditions of travel.

Senator Reynolds of Illinois said: "We left Knoxville with eight horses and two wagons for New Spain. Our company consisted of my parents, six children, three hired men and a colored woman. Our clothing, beds and some farming utensils, with our provisions, made the light freight for the two wagons, which was fortunate, as heavy burdens would have been a great injury to us. At the Ohio River our three hired men, who had been engaged to work for a year, abandoned us, taking with them three of our horses, and left us desolate in this wilderness filled with savages and wild beasts, extending on the north to the Pole it-

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self and on the west to China, except a few straggling settlements on the Wabash and Mississippi Rivers. The west side of the Ohio River was then called the Indian Country, but after making necessary arrangements at Lusk's Ferry, we crossed the Ohio. I recollect asking Mr. Lusk how far it was to the nearest town. He laughed and said, 'One hundred and ten miles to Kaskaskia.' We traveled on west, rafted four creeks and traveled around the head of another. In rafting the streams we took the wagons to pieces and crossed them in parcels. The horses swam over but were at times troubled to get up the perpendicular banks of the stream. We were four weeks traveling the journey from the Ohio River to Kaskaskia, one hundred and ten miles, and experienced much hardship and difficulty on the road. Arriving at Kaskaskia we were the seventh family there."

Griffiths, an English traveler in 1820, said: "With respect to markets for their products, the farmers of Ohio disposed of a great deal by bartering it away at stores in return for articles of dress, furniture, etc. Beef and mutton, which they raised themselves and which

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they could not export, sold for from three to four cents a pound. Pork, for which a slight export market could be found in the shape of hams and lard, brought six cents a pound, while sugar, which had to be brought in by the then laborious methods of transportation, cost twelve cents a pound. Potatoes which they raised themselves were exchanged at the country store on the basis of twenty-five cents per bushel. Butter for twelve and one-half cents per pound."

He further says: "A stout, active man in those western countries in those days received fifty cents a day and his board for wages; not often in cash, but what to the emigrant was as good as cash, namely, supplies which he was able to obtain at the store on his employer's account, or in pork, flour or potatoes, which he secured from his employer direct."

Birbeck, describing the traffic between Philadelphia and Pittsburgh, in 1817, says that "Twelve thousand wagons passed that year between Baltimore and Philadelphia and Pittsburgh, to which should be added numerous stage coaches loaded to the limit and innumerable travelers on horseback, on foot and in

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light wagons, and you have a scene of bustle and business extending over the three hundred miles of road that is truly marvelous. The freight so handled over the road cost seven dollars per hundred weight, or one hundred and forty dollars a ton."

Today the transportation between these points over the Pennsylvania Railroad costs about one dollar and fifty cents per ton, or one one-hundredth of what it did then.

Birbeck noted further that: "There was manufactured at Pittsburgh at this time a very fine quality of glass, but that the roads to Philadelphia and New York were in such condition that it was impossible to transport without breakage, so that our eastern ports were still compelled to buy their window panes in Holland, from which large quantities were imported annually."

The Chamber of Commerce of Cincinnati in 1847 asked Congress to assist in removing the obstructions from our great western highways. It declared: "A population of 7,000,000 has been planted in the Mississippi Valley and the commerce now afloat on the Mississippi River, and its branches, is greater in value than

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that which crosses the Atlantic Ocean. We represent," they said, "not merely the wants and interests of eleven states and two territories, but of the American people, and we invite the nation to join us in creating a great central chain of national intercommunication, having its connection with the ocean and extending its advantages westwardly throughout the wilderness to the extreme frontier.

"Those who purchase our products are interested in every tax upon our industry and those who supply us with foreign merchandise, or manufactured articles, are concerned in all the facilities for transportation by which their market is rendered accessible. *Whatever affects the cost of freight concerns all mutually who participate in the exchange of commodities. Every tax upon the products of the country* must be paid either by the producer or the consumer, or it *must be divided between them,* and whatever adds to the cost of our imports, it is so much taken in some shape from the pockets of the seller or of the buyer, and *all that is thus taken is so much wrested from the hand of industry and enterprise.*"

In 1852, when the only railroad in Ohio was

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the one from Cleveland to Cincinnati, and traffic with the east was either by river from Cincinnati to Pittsburgh and from Pittsburgh to Philadelphia or New York by rail, or from Cleveland to Oswego by lake and by canal from there to New York, the farmers in Ohio got only fifty cents a bushel for their wheat. It cost ten cents a bushel from any point on the railroad to Cleveland and twenty to twenty-five cents per bushel from Cleveland to New York by canal, so that wheat that cost fifty cents a bushel at the railroad station in Ohio, cost eighty-five cents per bushel in New York, and it cost forty cents a bushel more to transport it from New York or Philadelphia, to Liverpool.

In other words, the cost of transporting wheat from Ohio to Liverpool was *one and one-half* times the value of the wheat in Ohio.

In those days it took sixteen days to travel from Cleveland to New York via the lake and the canal. A friend of mine, Mr. Hoberg, made the trip in that year (1852) from New York to Terre Haute, Indiana, traveling by river from New York to Troy, by canal from Troy to Buffalo, by lake from Buffalo to To-

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ledo, from Toledo to Lafayette, Indiana, and from Lafayette to Terre Haute, via the Wabash and Erie Canal, taking six weeks for the trip.

The farm labor in Ohio and Indiana in the fifties was paid fifty cents a day and boarded themselves, except during harvest time, when wages were fifty cents a day and board. At this time Pittsburgh was the western terminus of the Pennsylvania Railroad, and a Pittsburgh manufacturer complained that their markets and prosperity were threatened by the high price of labor, which by reason of the railroads has risen to seventy-five cents and one dollar a day. Also, because the price of coal had recently risen as a result of a strike among the coal miners, who had been getting a dollar a day, and who had struck for and secured a raise to one dollar and a quarter a day.

"But," he adds, "commerce has come, bringing with it a market for the products of the pioneer farmers. The forests have been penetrated by roads, bridges thrown over the rivers and highways constructed throughout the wilderness. Traveling," he says, "has been rendered easy and transportation cheap. While

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in every village is seen the smoke of the manufactory and is heard the cheerful sounds of the engine and the hammer." This same observer reports that in Pennsylvania along the line of the railroad, labor commanded a dollar a day and had actually risen to a dollar and a half during the past harvest.

The Western States generally realized how much New York owed its development to the building of the Erie Canal, and DeWitt Clinton, who had been the sponsor for the construction of the Erie Canal, was a State hero. In 1837 Lincoln, then a member of the Illinois Legislature, urged the construction of a canal across the State of Illinois to the Mississippi, calling attention to what the Erie Canal had done for New York, and declared his intention of being the DeWitt Clinton of Illinois.

Senator Reynolds of Illinois declared that: "In the year 1836 the fever for internal improvement raged throughout most of the states of the Union. Pennsylvania," he says, "was crazy to improve the whole country whether the wants of the people required it or not. Indiana was almost as wild, and Illinois was considerably crazed with the mania."

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In 1836 Senator Reynolds, with some associates, built a short railroad six miles long from some coal property to the Mississippi River in order to supply coal to St. Louis. And even in those times, the engineers exhibited their usual failing, for the Senator records that: "Although the road was short, the engineers made an erroneous calculation of the cost, making their estimate less than half of the real cost." The members of the company overlooked the work themselves, employing for a while over one hundred hands a day. They built shanties in which to board the hands, procured provisions and lodging for them, graded the track, cut and hauled timber, built a pile trestle eighty feet high, two thousand feet over a lake, built the road and had it running in one season, in 1837. The promoters had not the means nor the time to procure from the East iron for the rails or a locomotive, so they were compelled to work this short piece of railroad with wooden rails and horse power. It was the first railroad built in the Mississippi Valley, and, as the Senator himself later asserted, it was the greatest work or enterprise ever performed in Illinois under such circumstances, and it brought

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to the promoters the usual reward of such enterprise, for the Senator records the fact: "It well-nigh broke us all!" But in 1855, at the end of his long and wonderful career, Governor (then Senator) Reynolds, said: "The railroad system has advanced our nation at least half a century, time and distance are almost annihilated."

Railroad Development in the United States.

There was no doubt in the minds of the American people, at that time, as to what they owed their prosperity and their success. To this new problem of transportation, the whole genius of our people directed itself. Not only individuals, but municipalities and states, joined in the work. Even the National Government recognized the fact that its great public domain, however valuable in its potentialities, was not only valueless but a burden so long as it remained inaccessible.

The traffic beyond the Mississippi before the end of the Civil War was chiefly by wagon train, which started westward from some river point like Atchison or St. Joe. A wagon train

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in the old days consisted of twenty-six wagons, with four yoke of oxen to each wagon. There were usually fifty well-armed men with each train, and, while there were many Indians, it was only the small outfits that usually suffered. The ox trains only traveled about fourteen miles a day, and three months were required for a round trip from Atchison to Denver. Three trips were made a year by each train, the stock being allowed to rest during the worst three months of the year. Twenty-five of the wagons in a train would be loaded with freight; the twenty-sixth wagon carried supplies for the teamsters and men en route.

The drivers of ox teams received thirty-five dollars a month and board, the drivers of mule teams from five to ten dollars more. An ox wagon carried from six to eight thousand pounds of freight, and the prices paid were such that the average wagon earned four hundred dollars per trip. Mule teams made the round trip from Atchison to Denver in forty days, and the price for carrying freight ranged from twelve to sixteen cents per pound, or fifty cents per ton-mile. In the winter the owners of mule teams received twenty-five cents a

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pound for freight to Denver. It was no uncommon sight to see four or five steamboats lying at the Atchison levee at one time. There was a regular line of packets between St. Louis and St. Joe, the average round trip occupying eight days. Coming up the river, the boats ran all night, but in going down they laid up as soon as darkness set in. The boats carried from two hundred to four hundred passengers on the trip, counting immigrants on the deck. The cabin fare from St. Louis to St. Joe ranged from ten to fifteen dollars. The average boat carried five hundred or six hundred tons of freight, and freight that now costs twenty cents a hundred cost then two dollars and fifty cents per hundred.

The first Colorado gold ores that came out, came by mule team to Atchison, where it was put into six hundred old coal oil barrels, and in these were sent by boat down the river to New Orleans and there transferred to ocean-going vessels for shipment to Swansea, Wales, for smelting. As the mule teams went west loaded and came back empty, this ore was hauled from Central City, Colorado, to Atchison, in consideration that it was down grade

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most of the way, for the exceedingly low price of two cents a pound. One of these wagon trains carrying flour, arrived in Denver during the famine, when supplies had run low, and the shippers made a small fortune selling their flour that had arrived so opportunely for twenty-five dollars a hundred pounds.

In 1864, 6,000,000 pounds were transported west from Atchison by these ox or mule teams, while in 1865, after the close of the war, this transport jumped to 17,000,000 pounds and two thousand new wagons were put into the business. One of these wagon trains, going through to Virginia City, arrived there and presented a freight bill for their twenty-six wagon loads, amounting to over forty thousand dollars. The merchants there being unable to pay, the wagon owners were compelled to open stores themselves and sell the goods in order to pay their charge for transportation.

In the day of pack trains, before the establishment of regular freight caravans from the Missouri River westward, it was no uncommon thing to pay a freight charge of one dollar per pound per hundred miles, or twenty dollars per ton per mile. There were special rates much

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higher even than this, but this was the regular tariff. This tariff, by the way, continues down to the present time, in those remote districts of our Western States where the pack animal is still used to reach small communities and mining camps distant from the railroads.

The demand for fast service following the discovery of gold in California led to the establishment of the "pony express," which by the establishment of stations one hundred miles apart from Independence, Missouri, to San Francisco, and the employment of one hundred riders and five hundred of the fastest horses that could be found, succeeded in carrying mail from Independence to San Francisco in ten to eleven days at a cost of five dollars per half-ounce.

Before the installation of the "pony express" the fastest time between New York and San Francisco was twenty-three days.

In 1861 when the railroad trains ran to St. Joe, Missouri, the news of Lincoln's election reached Denver (625 miles away) in three days, and news of Lincoln's inaugural was carried from St. Joe to San Francisco in seven days and seventeen hours, which to this day re-

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mains a record for such transportation over such distances.

Some idea of the cost of such method of travel may be gathered from the following fares charged by the stage coach line. The fare from Atchison to Denver (620 miles) was $175 (meals extra). It had formerly been as high as $350. In the early days when the rush for California was at its height $600 was charged for a seat in a stage coach from Atchison to Placerville, but naturally these prices brought forth a great increase in the number of coaches and the traffic, so that by 1868 Halliday's coach line advertised the fare from Atchison to Placerville at $225, meals extra.

In 1865 Schuyler Colfax, then a member of Congress from Indiana, with Samuel Boles, of the Springfield (Mass.) "Republican," made the trip from Atchison to Denver in four and one-half days, and from Salt Lake City to Virginia City (Nevada), 575 miles, in seventy-two hours. The seventy mile stretch from the Summit to Placerville, California, was made in seven hours.

The Government determined to open up its great public domain and make it valuable by

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making it accessible. And embarked upon a career of building railroads so colossal that it seems impossible that the original promoters of this work can have anticipated the result.

The growth by decades is shown by the following table:

	Population	Miles of road	Internal Commerce	Wealth.
1850....	23,191,876	9,021	$2,000,000,000	$7,135,780,000
1860....	31,443,321	20,626	3,500,000,000	16,159,616,068
1870....	38,558,371	52,922	6,250,000,000	30,068,518,507
1880....	50,155,783	93,262	7,750,000,000	43,642,000,000
1890....	62,622,250	166,703	12,000,000,000	65,037,091,197
1900....	76,303,387	193,345	18,000,000,000	94,300,000,000
1910....	91,900,000	240,000	30,000,000,000	130,000,000,000

From this table it will be seen that in 1850, when the population of the United States was already more than 23,000,000 and the country was dependent almost entirely upon canals, rivers and steamboats, having only nine thousand miles of railroad in the entire country, the national commerce of the United States amounted to only $2,000,000,000 per annum, while the total wealth of the country amounted to only a little more than $7,000,000,000, or about $300 per capita.

In the sixty years that have elapsed from

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that time down to 1910, the railroad mileage of the United States, through our genius for transportation, has grown from 9,000 to 240,000 miles—more than twenty-six times what it was sixty years ago. During this same period our population has increased from 23,000,000 to 92,000,000, or only about four times.

But our four times as many people have been so well served by our twenty-six times as many miles of railroad that our internal commerce has grown from $2,000,000,000 to $30,000,000,000, or fifteen times as much. While our wealth has increased from $7,000,000,000 to $130,000,000,000, or eighteen and one-half times as much, until now our national wealth is $1,400 per capita.

The effect of this railroad development upon manufactures is shown in the State of Ohio which in 1850 already had a population of nearly 2,000,000, and was really better served by its rivers and canals than any other interior state, yet the total values of its manufactures in 1850 was only $62,000,000. But, with the development of railroads in the State, and from the State eastward to the coast, manufactured products of the State grew rapidly in value,

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amounting to $121,000,000, in 1860; $269,000,000, in 1870; $848,000,000, in 1880; $500,000,000, in 1890; $605,000,000, in 1900, and $1,200,000,000, in 1910. Or, in other words, while the population of the State of Ohio has grown from 1,980,000 in 1850 to 4,767,000 in 1910, or an increase of only one hundred and forty per cent., the products of the labor, of her inhabitants has increased 1,900 per cent., or fourteen times as fast.

It is apparent from this that of two equal populations, one of which has better transportation facilities than the other, that population having the better transportation facilities will surpass the other population in commerce and wealth in a degree that bears a definite proportion to its excellence in transportation.

It is a fact, though we seldom stop to recall it, that the price of a finished product in the market of the world, is made up of the cost of manufacture plus the cost of transportation. Reduced to its lowest terms, the cost of every manufactured product is simply the cost of the labor to produce it. For the cost of the so-called "raw material" is simply the cost of the labor to produce it, whether it be digging the

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ores from the mines, gathering the ivory in the forests of Africa, hides on the plains of Argentina, or shearing wool from the backs of sheep.

Under primitive conditions transportation itself is simply labor, and the cost of transportation is simply the cost of the human labor necessary to carry the finished product to market, and you have seen how the race has labored and striven from the beginning of time to relieve itself from the burden of transporting its product by the costly and laborious methods that still more or less prevail.

And you have seen how by the development of modern means of transportation, of the canal, of the steamboat, of the railroad, that labor has been more and more relieved of its burden of transportation. But it is hard for you who are familiar only with modern means and methods of transportation to realize how much you owe to the introduction of these modern methods.

The value of every commodity depends upon the breadth of the market for it, and particularly is this true of the value of labor. For labor necessarily depends for its value on the facilities which exist for transporting its products to

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market. Thus in China where the facilities for transportation are poorest and most primitive, we find the cheapest labor. Cheap, because it is confined for a market for its product to itself—thus literally eating itself up—because it is cut off from the markets of the world by the high cost of reaching them.

It is interesting at this point to notice the proportion in which the leading nations of the world have taken advantage of these means of transportation.

	Population	Miles of Railroad	Miles per 10,000
Great Britain.....	45,216,000	23,280	5.14
France	38,961,000	24,915	6.38
Germany	64,900,000	36,235	5.58
Austria	32,475,000	10,000	3.08
Russia	160,000,000	35,347	2.21
United States.....	91,900,000	240,000	26.11

These Figures Are for 1910

It will be seen from this table that the average man in America is more than four times better served with railroad facilities than the average Frenchman, who, next to ourselves, are the best served by their railroads of any people in the world. While the average American is five times better served in this respect than is

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the average inhabitant of Great Britain or Germany, who are our chief industrial rivals.

From this it is easy to see how much greater is the opportunity of the average American to market the products of his labor, and how much wider is the market which these products may reach. For you must take notice of the fact that markets increase in proportion to the square of the radius of the transportation lines that reach them and that labor's opportunity widens in a like proportion.

Sir Josiah Child, the great merchant of London, during the reign of Charles I, who was the establisher of the East India Company, stated, in 1635, that "The growth of commerce in England had brought such wealth to England that there was then in London more merchants worth one thousand pounds apiece than in 1600 were worth one hundred pounds apiece. As the result of this commerce," he declared, "wages had risen one-third in twenty years, rents had only increased one-fourth in the same time, while land values had tripled."

I have in my office two receipted freight bills covering the transportation of a bale of rugs from Tsun Hua, China, to New York City.

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The shipment from Tsun-Hua to Tien-Tsin, a distance of ninety miles, was by camelback, and occupied five days, for which I paid the sum of $4.70. At Tien Tsin the rugs were placed on board steamer, shipped to Shanghai, where they were transferred to another steamer that brought them from Shanghai to New York City. The distance from Tien Tsin to New York being about seventeen thousand miles and the freight charge therefor, including the transfer at Shanghai, amounted to $4.30. It cost more by camelback for ninety miles under primitive conditions than it did by steamship under modern conditions for seventeen thousand miles, and the camel driver received only ten cents a day wages.

But the cost of transportation is not alone governed by the methods of transportation employed, but in civilized countries where practically the same methods of transportation prevail, they are governed by skill in operation. Nowhere else in the world has railroad operation been reduced to the science that it has in this country, where our train loads average three times those of Europe and our ton-mile rates are not only the lowest, but are scarcely

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one-third those of our nearest competitors.

At this point I wish to call your attention to what American railroads have enabled us to do for American labor:

COST OF TRANSPORTATION

Country	Per Ton-Mile in Cents	Wages per Day
China	$0.10	$0.10
Japan	.05	.23
Russia	.022	.34
Italy	.024	.26
Austria	.0225	.50
Germany	.0150	.90
France	.0190	.80
England	.0260	1.04
United States	.0069	2.60

From this it will be seen that in China, where the cost of transportation amounts to ten cents per ton-mile, wages only average ten cents per day. In Japan, which by reason of a small railroad system and fair means of water communication, has reduced its average cost of transportation to five cents per ton mile, the wages are about twenty-three cents per day. In Russia and Italy, which of civilized countries have the lowest railroad mileage in proportion to population and a high average cost per ton mile for transportation, the average wage is only

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thirty-four and twenty-six cents per day, respectively.

In Germany, France and England, which approximate each other in the average cost of transportation per ton-mile and in their average mileage of railroad in proportion to their population, there is a fair approximation of the average wage. While in our own country, where we have the greatest railroad mileage in proportion to our population, and the lowest cost of transportation, *we have the highest average wage to be found in the world; the highest wage, in fact, of which there is any record in history.*

These figures were prepared by me in 1902 and I have purposely left them the same because subsequent changes have proved the correctness of my deductions. The increase of transportation facilities to and from Japan has almost doubled, and there has been a very large increase in the internal transportation facilities by the construction of steam and electric railroads, and wages in Japan have risen over forty per cent. in the past ten years. A rise in English rates during this time has resulted in a fall in English wages, while a reduction in German

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rates has resulted in a rise in German wages, until now they are higher than the average wage in England.

The industrial development of America, the great demand for labor and the high wages that exist in our country today are due almost alone to our wonderful railroad development and to the cheapness of our transportation rates.

Were the farmers of Kansas and Minnesota compelled to pay such transportation charges as the farmers in China, it would cost them one hundred and fifty dollars a ton to ship wheat from their farms to New York, or four thousand five hundred dollars for a thirty-ton car holding eleven hundred bushels. In other words, their wheat worth only a dollar a bushel on the farm would cost six dollars a bushel delivered at tidewater.

Were the steel mills of Pittsburgh compelled to pay only as much as the manufacturer of Japan for the transportation of their products to market, it would cost them twenty-five dollars a ton to deliver steel rails on board ship. Pittsburgh rails costing twenty-five dollars a ton at the mill would cost fifty dollars a ton in New York, while Chicago rails facing

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a transportation charge of fifty dollars a ton would have to be manufactured for nothing in order to compete with Pittsburgh rails in the Atlantic coast market.

It is easy to see that industrial development in competition with conditions as we know them in America, is impossible in a country like China, where coal mined by cheap Chinese labor at a cost of only twenty-five cents a ton at the mouth of the mine is raised by the mere cost of transportation to eight dollars per ton when thansported a distance of less than forty miles. Under such conditions the consumption of coal is naturally limited to a small radius around each mine, as it was in England, and it is impossible to develop any mining industry.

Nowhere has the result of our transportation system been better shown than in the development of the *coal and iron industry.* In 1850 our coal production was only six million tons. In 1912 it was five hundred and twenty-five million tons. *Nearly ninety times as large,* and twenty times as much per capita. It has more than doubled in the past twelve years, for it was only two hundred and forty millions in 1900. In 1882 the total production of *iron*

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and steel in the United States was 4,600,000 tons; Great Britain's being almost twice as large, amounting to 8,600,000 tons.

By 1890 we had passed England, producing 9,200,000 tons to Great Britain's 8,000,000. By 1900 we were producing 13,789,000 to England's 8,960,000, while in 1910 we produced 27,300,000 tons to England's 10,200,000 tons, or nearly *three times* as much as Great Britain, whose production that year was the highest it had ever been.

The miners of this country should recognize the fact that *were it not for the wonderful cheap rates made by our American railroads for the transportation of coal, that not one mine in one hundred* would be open today and that most of them would be seeking employment, as *are the inhabitants of most other countries, at wages averaging about one-fourth what they are earning today.*

To the development of the art of transportation is due two of the greatest boons that have been brought to the human race. Until transportation made it possible to distribute coal long distances from the mines, the race gradually burned up its available wood sup-

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ply and then piled on clothes and shivered through its winters. The relief of civilized man from the pain of cold has been due entirely to the development of transportation. But most important of all, the development of transportation has relieved mankind of the agony of fear and superstition that came with physical darkness; cheap transportation has put cheap illuminants into the remotest corners of the world. The introduction of Standard Oil into Africa, into Arabia, into India, China and Japan has done more in forty years to banish not only physical darkness but mental and spiritual darkness than all the missionary forces could have accomplished in a thousand years. Fear and ignorance and superstition dwell in physical darkness and artificial light, which banishes night, drives out fear and superstition with it. The time will yet come when John D. Rockefeller and his associates will be recognized among the greatest benefactors that the human race has ever had.

In our country it is well known that as the railroads have reached out into the new country, wages have steadily increased and the price of farm products have steadily risen.

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Wages have always been low in those parts of the country far ahead of or removed from railroad facilities, and today the lowest wages found in the United States are in those states that have the poorest railroad facilities. Whenever the railroads came into a new community the wages almost immediately doubled.

COST OF TRANSPORTATION PER TON-MILE

Year	In Cents	Wages per Day
1850	3.50	$1.23
1860	2.74	1.50
1870	1.99	1.97
1880	1.26	2.13
1890	.92	2.50
1900	.69	2.60
1910	.76	2.75

It will be seen that as our transportation rates have steadily fallen, the wages of labor have steadily risen, and that, too, in an almost constant proportion.

In the last decade the slight rise in ton-mile rates is due to the operation of the Hepburn Law, which has also operated to slow down the rise of wages.

In the last sixty years our railroad mileage has grown from a few thousand miles of scattered and disconnected links into a great rail-

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road system of over two hundred and forty thousand miles.

Every mile of which is in connection with every other mile, equalizing labor conditions and leveling prices throughout the whole country, preventing either local famine or local waste of surplus. This and the reduction during that same period of our railroad rates from three and one-half cents per ton mile to 6.9 mills, or less than one-fifth what they were fifty years before, has enabled us to accomplish the greatest miracle that the world has ever seen.

The whole land area of the earth is 55,000,000 square miles, and the area of our United States is only a trifle over 3,000,000 square miles, or less than one-eighteenth of the area of the globe. The best statisticians have estimated the entire value, or wealth, of the earth at about $550,000,000,000, or in round figures, $10,000,000,000 of value for each million square miles.

Our proportion of this with our 3,000,000 square miles would be $30,000,000,000, but instead of the wealth of the United States being $30,000,000,000, or one-eighteenth of the

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wealth of the world, it is, in fact $130,000,000,000, or, in other words, our little one-eighteenth of the surface of the globe is worth one-fourth of all the values on earth. I can only suggest what the possession of such wealth means.

And the thing which makes this true, is the fact that there is no other equal area on the surface of the globe whose remotest acre is so accessible. It is due to the fact that over our one-eighteenth of the earth's surface is distributed one-half of *all* the railroad mileage on the earth, while the other seventeen-eighteenths of the earth's surface is struggling along with the other half.

Not only is our national wealth due to our transportation system, but our railroads are at the foundation of our industrial prosperity, and their cheap rates for transportation are the prime factors in our industrial supremacy, *and it is time for American labor to realize it. The less it has cost labor to market its product—the more there has been left for labor to enjoy.*

Where it cost the primitive man a day's labor to move freight a single ton-mile *we have so developed the science of transportation and so reduced its cost that the cost to us of transport-*

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ing a ton of freight a mile is only about 1-300ths of the value of a day's labor. While the best that England, France or Germany has been able to do is to reduce it to 1-60th of the value of a day's labor. A figure approximately equal to the proportion of railroad mileage per capita, a proportion too significant to be anything but conclusive.

There is no question but that the high standard of American wages and our correspondingly high standards of living have been brought about and made possible by our low transportation charges. By the extent, if you please, to which we have relieved labor from the handicap under which it has labored from the beginning of time.

Buckle has stated: "That civilization is measured by the diffusion of knowledge," but he did not dream how this diffusion would depend upon the development of transportation facilities and the means of communication.

In 1850 there were only 2,500 newspapers published in the whole United States, and these, owing to the difficulty of distribution, did not circulate far from the cities or towns in which they were published. These news-

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papers made about *one for every ten thousand of our population.* But in 1910 we had 23,000 newspapers published in the United States, or *one to every four thousand population,* and these, owing to the ease with which they are distributed, have a circulation that reaches into figures almost unbelievable and unmeaning.

There are less than 60,000 newspapers published in the whole world today, and of these forty per cent. are published in the United States. This is nearly three times as many as are published in the whole British Empire; more than three times as many as are published in the German Empire; four times as many as are published in France; eight times as many as are published in Austria-Hungary; nine times as many as are published in Italy and more than twenty times as many as are published in any other country in the world.

While in the matter of circulation our American newspapers and magazines so completely exceed those of the rest of the world that it is estimated today that more than *sixty per cent.* of all the copies of newspapers and magazines published in the world are printed, circulated and read in the United States of America.

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I have spent so much time on railroads that I can here but mention the significance in our national life of the telegraph and telephone, both the inventions of Americans. What is true of our supremacy in the railroad world is almost as true in telegraphy. Practically one-half of all the telegraph stations and telegraph business in the world is confined to the limits of the United States.

In the world of telephony, our position is nothing less than astounding. Over two-thirds of all the telephone wires on this globe are within the limits of our United States, and over seventy per cent. of all the telephones on earth are used by our people.

The figures—for the year 1913—show that *seventy per cent. of all the automobiles on the earth are in use in our United States.* Next to us stands England, France and Germany, in the order named, but *New York uses more automobiles than Great Britain; Pennsylvania more than France, and Ohio more than Germany.* The automobile is really becoming the greatest supplement of our railway service. Newman Erb recently stated: "A few years ago, when farm lands located near the railroad

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were worth from seventy-five to a hundred dollars an acre, land twenty miles back from the railroad could hardly be sold for ten dollars an acre, but with the introduction of the automobile this latter land has been brought within a few minutes' run of the railroads and its value has increased enormously because of this fact. The farmer who owns an automobile and lives twenty miles from a shipping point is today nearer to the markets of the world than the man whose land is three or four miles of the railroad formerly was. The automobile today covers the twenty miles in less time than the horses took to cover three. The use of automobiles in country distances has within the last five years added over two billion dollars to the value of farm lands alone."

And it is no mere accident that the *first real* mechanical conquest of the air was accomplished by two typical American mechanics.

Yes, the development of transportation facilities is at the very foundation of all material progress. Commerce and industry wait upon them and prosperity and increase of wealth halt and mark time when their advance ceases. The reward of labor and the field of opportu-

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nity are dependent upon them. For in the absence of transportation facilities and in the presence of a high cost of transportation, industry languishes, labor finds little to do and wages remain low. *While as transportation facilities increase and transportation costs grow lower and cheaper, industry thrives, markets widen, commerce grows and wages increase by leaps and bounds.*

Up to this point I have barely suggested that political ideas were dependent for their diffusion upon such means of transportation and communication as existed when and where these ideas first developed.

In the absence of transportation facilities the religion of Egypt died with its people.

The Turanians carried their civilization as far and wide as their horses could carry them.

The Greeks had a habit of expelling their advanced thinkers to some more or less remote island, where, with their followers, they might organize a government to suit their own ideas.

Confucianism remained within the confines of a land whose people regarded it as a sacrilege to abandon the tombs of their ancestors. Buddhism was carried only as far as its priests

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measured their lengths along the dusty roads of the East.

Mohammedanism swept like a prairie fire around the shores of the Mediterranean, because its followers rode on the swiftest horses that the world has yet produced; *while Christianity, driven from its home, crept slowly along the northern shores of the Mediterranean and up into Europe on the weary feet of its early saints.*

The Crusades failed because the Crusaders lacked knowledge of the problem of transporting themselves to the Holy Land, or keeping themselves in supplies after they had arrived there.

It is only now, since the followers of Christ have appropriated the modern means of transportation, that they have recalled the ancient injunction to go to the uttermost parts of the earth, and are now turning back to the conquest of the world.

Brook Adams, in his Law of Civilization and Decay, says: "That the surest way of measuring the advance towards civilization is by the state of progress of the art of military engineering." But this is only another way

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of exalting the science of transportation. Military engineering consists almost entirely of the science of transportation; first, the transport of the armies themselves; second, the transport and organization of the commissariat; third, the transport of military engines; and fourth, the transport of the material for the construction of defences.

The armies of the Medes and the Persians almost invariably dissipated and faded away under the difficulties that impeded their advance. The failure of the Persian invasion of Greece was the failure in their system of transport. The success of the Romans was due to their mastery of transport, under the then existing conditions. Such success as attended the invasions of Attilla and Genges Khan was due to their swift riding men and equally swift trains of pack animals.

The mastery of the Spaniards over the Mexicans and Indians in their conquest of Mexico and Peru was due quite as much to their possession of horses as to their use of firearms. And this was recognized in one of the earliest Spanish laws in relation to the Indians—a law which not only prohibited, but which made it

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a capital crime to sell a horse to an Indian.

Read the history of the Napoleonic wars! It will satisfy you that Napoleon's success lay not in any peculiar genius for fighting, but in his engineering ability—his mastery of the art of transportation.

His aphorism that "God is on the side of the heaviest artillery" is but another way of expressing the superiority of those who are able to move and transport heavy artillery. And his thought is carried down to the present time in the competitive struggle going on between the nations of the world, to invent and build battleships, not only carrying heavy guns but heavier guns, or, if possible, the heaviest gun, and they measure potency by the superior carrying power both in weight of metal and distance covered, of the shells belched from their lips.

Our Civil War was, as I have called to your attention, the triumph of superior transportation facilities which gave greater mobility and consequently greater attacking power to the armies of the North.

The confederation and consolidation of the German States was impossible prior to the de-

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velopment of German railways. And the realization of the German Empire from these German States has been possible since 1870 only through the growth of the German railway system from less than ten thousand miles to over thirty-six thousand miles.

The Russo-Japanese war is the last expression of this same principle. The Russians were conquered not by better soldiers, but by men who were their masters in the art of transport; and Russia is today bending all her energies not to the creation of a larger army with which to try eventualities with Japan, but to the double-tracking of her Trans-Siberian Railroad. You may depend upon it that the wars of the future will be determined absolutely by the superior transporting ability of one side over the other.*

The moral philosophers of the past have assumed that there was no relation between the material conditions and moral ideals. Lecky even declares that: "The essential qualities of national greatness are moral—not material." But he is wrong. *There were no morals until*

(Note: *The above was written two years before the outbreak of the present World War, but the conduct of it and the probable outcome prove the truth of this statement.)

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there was something to be moral about. Some theologian has recently called attention to the fact that the primitives labored under no sense of sin.

Respect for property rights does not come until there is property to be protected; nor does respect for the person of another come until life itself has some value above mere existence. In the early days, killing was punished only by a fine measured in terms of the food-producing power of the person killed; and respect for the persons and rights of women did not come until women became more than beasts of burden.

The very fatalism of the Orient is due to the lack of transportation, for how can one escape the pestilence or the famine when one has only his own feet with which to fly therefrom? The condition of the poor in Europe and England before the beginning of modern transportation was like that of the poor of India and China —absolutely hopeless.

The movement in England for better social conditions, the care of the insane, the protection of women and children, did not begin until after the building of roads and canals in Eng-

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land had brought about sufficient travel and inter-communication between the different parts of the Kingdom, to call attention to the fact that different conditions existed and different degrees of care were exercised in different parts of the Kingdom.

It was only by the development of cheap transportation that cheap food could be brought to the poor, or that the poor could be transported to places where they themselves could better produce their own living. It was not until modern transportation was under way that Robert Dale Owen began to investigate the conditions of the laboring classes in Lanarkshire. The demand for higher wages or shorter hours was practically unheard of until the introduction of railroads came to relieve labor from the handicap under which it had previously labored.

It was not until after the introduction of railways that the first demand was made in America for a ten-hour day.

Until 1851, sixty-five cents was the average pay per day in the then United States for unskilled labor. Laborers on the new railroads received seventy-five cents to eighty-seven and

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one-half cents per day, but the increased demand for labor to build railroads which were being projected everywhere, created such a demand for railroad laborers that in 1852 the wage on railroad construction was raised to one dollar per day. But the boom of railroad construction continued without abatement, so that in 1853 the railroad laborers, who the year before had been satisfied with the raise to one dollar for a twelve-hour day, struck again and the abandonment of their positions by men working in other occupations to seek employment in the railroad camps resulted in a general raise in wages for all classes of work.

The Malthusian theory of population may be true of fixed and immobile populations, but it breaks down in the face of modern cheap transportation, which enables populations to move into better conditions with ease. The hard times of 1837 filled up our Central States. The panic of '73 peopled the trans-Missouri country, while the depression of 1893 poured myriads into the country west of Kansas City and Omaha.

Every mile of railroad built out into the wilderness has acted as a safety valve for conges-

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ted populations. Behind the brains and courage that have built thousands of miles out into the wilderness, where not a human being lived, where not an ounce of traffic was produced, was the faith that when this wilderness was made accessible, the multitudes, filled with courage and hope, would flock into it and develop its resources.

Emancipation from any condition comes to mankind only from an acquaintance with some people somewhere who are free from that condition; and this acquaintance has only been gained by travel and observation.

A new discovery, a new invention, a new idea, spreads only as fast and as far as the means of communication permit, and advance in civilization has always followed the existing lines of travel and communication.

The very first effect of travel is to cause the traveler to challenge the reasons for the conditions with which he is familiar at home.

From the beginning of history, commerce and skepticism have gone hand in hand. Nowhere has faith or superstition been able to stand against the rise in material wealth that has followed the development of transporta-

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tion and commerce.

The centers of theological non-conformity have always been those parts of the world richest as the result of their commerce. The denial of the Catholic dogma and the rise of the Reformation were due to the development of commerce. The wealthy burghers of the Low Country were the sturdiest advocates of the Reformation.

The Inquisition in Spain trampled out heresy, but with it, it extinguished also the race of seamen and adventurers that had made Spain dominant in the New World. The Reformation in England was not due to the interference of the Pope with Henry's love affairs, but to the drain on English money caused by the demands of the Pope for Peter's Pence.

As early as the fourteenth century the British Parliament passed a law to prevent money being taken out of England by the religious claims of the Popes of Rome, and it is not unlikely that something of the same kind will occur here when American Catholics realize that, though they have little or no voice in the control of the Church at Rome, their millions of contributions are its chief support.

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The supreme fact that brought on our American Revolution was not taxation nor lack of representation, but the fact that—that taxation of which they complained was a hindrance to their transportation and communication and laid a handicap upon the trade of the Colonies upon which their prosperity depended.

Japan's progress in civilization has been entirely along material lines. Realizing the importance of transportation, Japan has bent every energy towards shipbuilding and the control of commerce, not only in the Pacific but throughout the Orient. Railroads and electric lines are connecting up their cities, factories are multiplying, and wages increasing. Material civilization—that which betters the physical conditions of living—is the one which Japan is absorbing first. The missionary propaganda has left them practically untouched, but with increased comfort and physical ease will come leisure for contemplation that shall give to Japanese thinkers and philosophers time to consider the spiritual and ethical significance of the civilization that has done so much for the improvement of their physical condition.

The same thing is true of China in transition.

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Her revolution was brought about by the fact that her thousands of students to other countries had become accustomed to higher standards of living and returning to China they were unwilling to drop back to the old standards of living. The material features of our civilization can be seen making progress; but when you know that in China hardly one man in a hundred has ever known what it means to be full, you will realize that until this great race has been fed and relieved from the pangs of hunger, until it has been clothed and relieved from the pangs of cold, you cannot expect the Chinese people to pay much attention to anything else but the development of transportation and the better distribution of the necessities of life.

I think now that you will agree with me that the progress of civilization is marked by the development of the means of transportation; that civilization is measured by the degree with which mankind has surmounted his natural limitations in time and space. If civilization means, as I think it does, the emancipation of man from his physical burdens, the raising of his standard of living, the blessing of almost universal knowledge and leisure in which to

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appreciate and enjoy the best things on earth, then this country of ours, which has levied upon the world for our necessities—this country, in which the luxuries of other climes have become commonplace—this country, which has sifted and transformed the world's best thought and made it our own—this country, where wealth is drawing to our shores the art treasures of the world—this country, where labor's penalty is the lightest and labor's leisure the greatest—this country, in which the science of transportation has reached its highest development—marks the highest stage yet reached in the on-flowing tide of civilization.

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